Driving Factors Behind Adopting Virtual Testbeds for ICS Cybersecurity Education

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16 critical infrastructure sectors







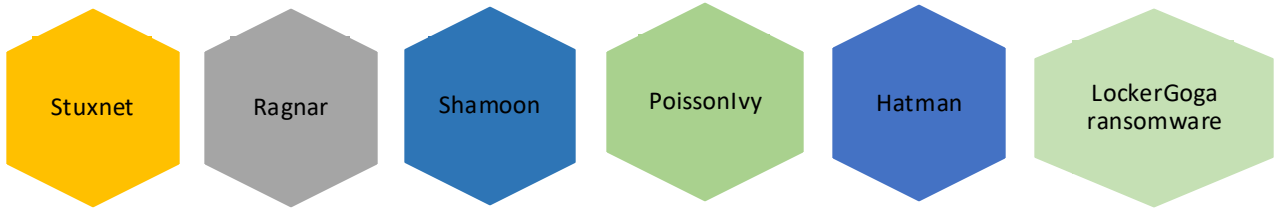




Background

ICS cybersecurity education is at low compared to the rapid increase of cyber threats on Industrial controls systems that control our critical industrial processes

- Cyber attacks target ICS system



- The potential gains attracted illicit cyber-related activities

Motivation

- Industrial Control Systems (ICS) present unique educational and research challenges that significantly limit hands-on learning opportunities.

- Although the virtual cybersecurity testbed serves as an alter-native environment for experimentation, there IS ICS training gap caused by restricted access to real ICS environments.

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- ICS systems are owned and privately owned
- Unavailable for training
- Strict confidentiality
- Resource intensive

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Research question

- What factors influence the use of virtual cybersecurity testbeds for ICS cybersecurity education?

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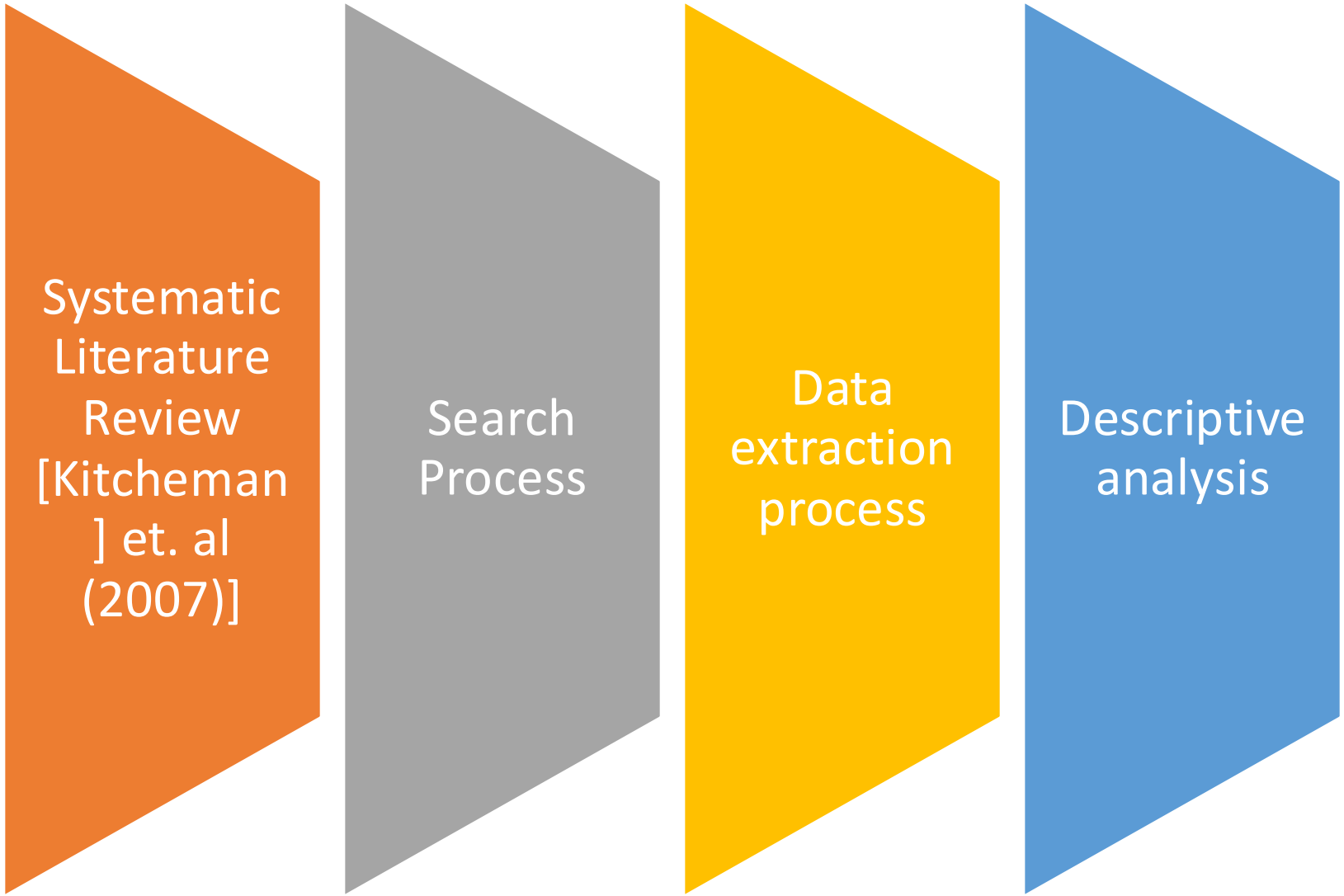
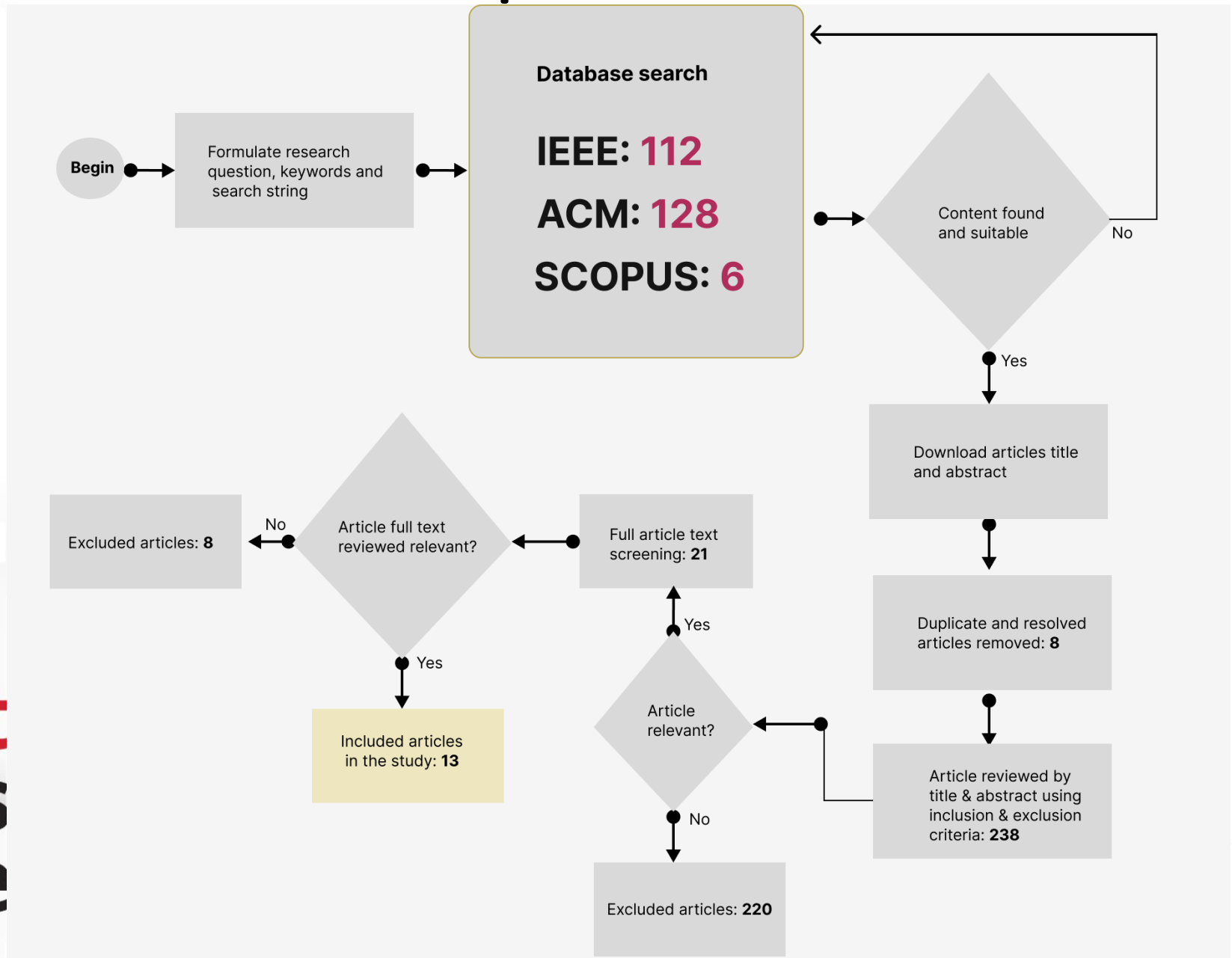
Research Method



Data collection process



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Result

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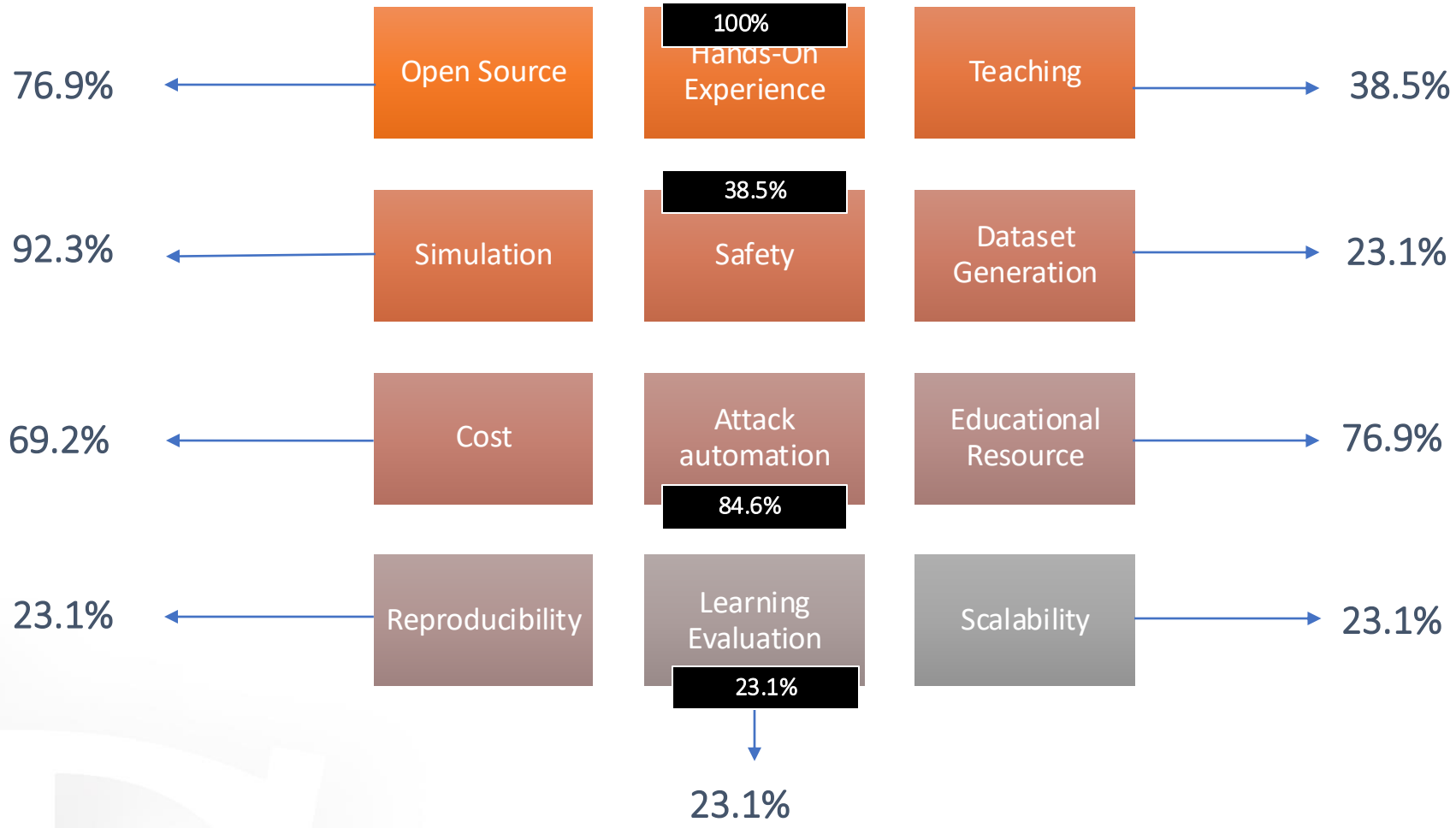

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Based on the results, the study observed multiple factors that contribute to the use of virtual cybersecurity testbeds for ICS cyber-security education.

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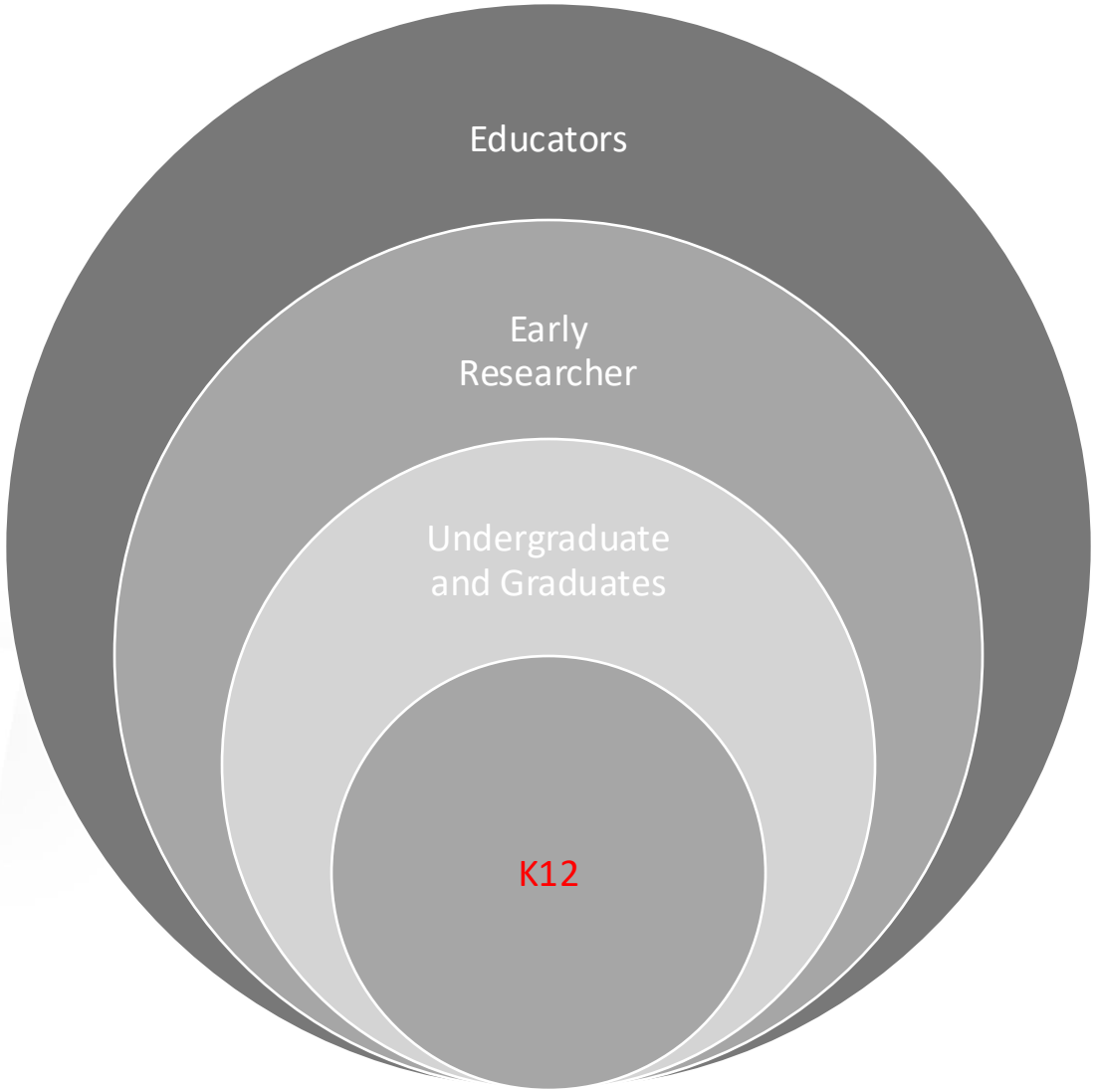
Users of Virtual cybersecurity testbeds.



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Findings

The study shows ICS testbed are useful for practitioners and educators alike.

virtual testbeds offers accessible, safe, and cost-effective educational environments

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What can be done with virtual cybersecurity testbed?

INSTRUCTORS

- Teach ICS Cybersecurity
- Cost effectiveness
- Remote Possibility
- Educational Resource

LEARNERS

- Hands-On Experience
- Interactive Learning
- ICS Knowledge and Skills
- Learning Evaluation

EDUCATIONAL BENEFITS

- Open Source
- Reproducibility
- Dataset Generation
- Scalability

APPLICATION

- ICS Cybersecurity
- Safety
- Attack/Attack Automation
- Simulation

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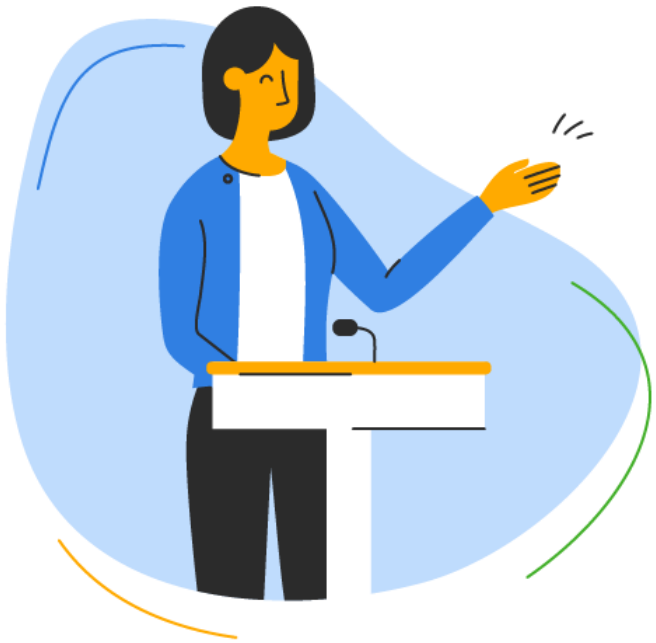
Contributions

- The paper identify and categorize factors for adoption of ICS cybersecurity testbeds in education.
- Guides educators and researchers on design priorities hands-on, open-source, cost-effective ICS testbed

Summary

- Industrial Control Systems (ICS) present unique educational and research challenges that significantly limit hands-on learning
- virtual testbeds offers accessible, safe, and cost-effective educational environments
- Educators and researchers needs to collaborate and design hands-on, open-source, cost-effective ICS testbed



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