



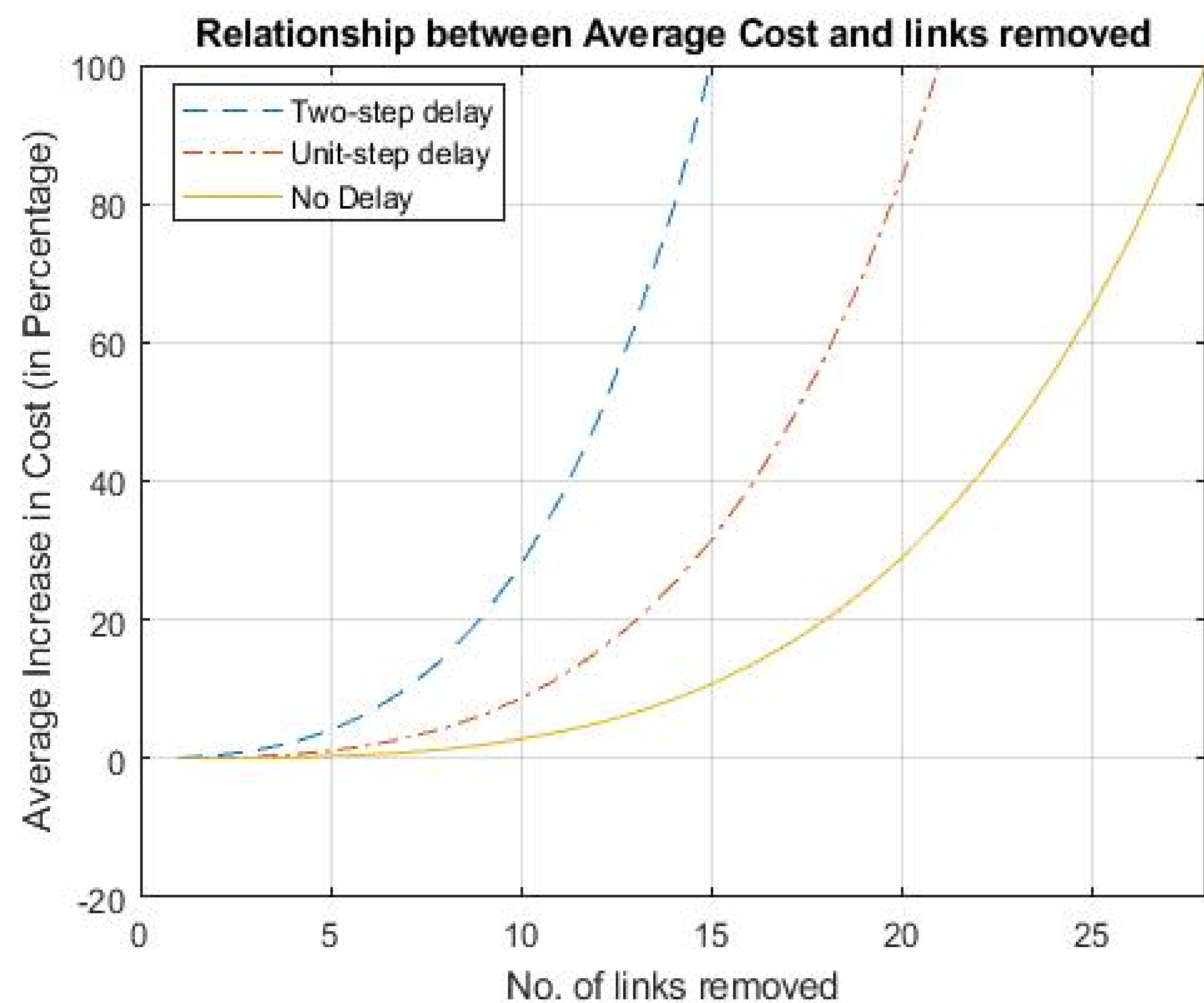
CRII: CPS & SaTC: Securing Smart Cyberphysical Systems against Man-in-the-Middle Attacks (CNS 1565487)

Challenge:

- Optimal decision making with incomplete information
- Update optimal policy in case of an interrupted or jammed link
- Identify critical and redundant links for security and better utilization of limited bandwidth

Solution:

- Model: Stochastic team with asymmetric information
- Compute optimal policy of the team by reducing the problem to a convex optimization problem
- Extend optimal policy to dynamic teams with delay
- Study the relation between performance degradation and removal of communication links



Relationship between average increase in optimal cost and number of links removed for multistage stochastic problem with delays where average is taken over 10,000 random stochastic systems

Number of stages: 7, single agent optimization

Scientific Impact:

- Laying a foundation for design of next generation of secure systems
- Delay and performance tradeoff—can be used to enhance security of communication links
- Future work: develop dynamic cryptographic keys

Broader Impact:

- Identified how to decentralize to best utilize communication resources
- Trained several undergraduate students through capstone projects; trained one MS student; hired a PhD student
- Mentored one high school student on ill-effects of cyber-attacks on control systems
- Increased awareness about cyber-threats by conducting group meetings

Award number: CNS 1565487

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