Rajesh Ganesan, PhD

Associate Professor, Department of Systems Engineering and Operations Research

Affiliate Member, Center for Air Transportation Systems Research

Education

PhD, Industrial Engineering, University of South Florida

Key Interests

Cybersecurity | Defense | Stochastic Optimization | Reinforcement Learning | Wavelet Analysis | Complex Adaptive Systems | Health Care | Mathematical Programming

CONTACT

Phone: 703-993-1693 | Email: rganesan@gmu.edu

Website: http://mason.gmu.edu/~rganesan/

SELECT PUBLICATIONS

❯ DeGregory, K. W., Ganesan, R. Scheduling federal air marshals under uncertainty. In *Applied Risk Analysis for Guiding Homeland Security Policy and Decisions*, S. Chatterjee, R.T. Brigantic, A.M. Waterworth (eds), Wiley, 2020, to appear.

❯ Ganesan *et al*., Optimizing alert data management processes at a cyber security operations center. In *Adversarial and Uncertain Reasoning for Adaptive Cyber Defense: Building the Scientific Foundations*, S. Jajodia, G. Cybenko, P. Liu, C. Wang, W. Wellman, (eds.) Springer, Vol. 11830, 206-231, (2019).

❯ Karuna *et al*., Generating hard to comprehend fake documents for defensive cyber deception. *IEEE Intelligent Systems*, Vol 33 (5), 16-28, (2018).

Research Focus

Operations research deals with the application of advanced mathematics and computational methods to help make better decisions involving large and complex systems. There are many uses for operations research, but one of the most difficult problems that Rajesh Ganesan investigates is the sequential decision making problems under uncertainty. His operations research applications include decision making in cybersecurity, defense, health care, sports analytics and air traffic management. In one of his recent papers, he provided a framework for establishing and maintaining an effective cybersecurity analyst workforce to minimize cybersecurity risk. His health care research work addresses a very important public policy and ethical problem: who, among those waiting, should be selected for a liver transplant, not only minimizing geographical disparity in access to livers but also extending organ life. In a recent paper, he explored the use of a fundamental reinforcement learning (RL) model for determining convoy schedules and route clearance assignments in light of attack dangers faced by transportation networks where improvised explosive device (IED) attacks are common.

Current Projects

- Robust reinforcement learning with perturbed rewards investigates the adversarial attacks on the reward function of an RL algorithm.

- There are many decisions made in a cyber security operating center, and formal models help the manager to better allocate resources.

- Data analysis is key to understanding the signal that the data represents. Often, new techniques are needed if the data is noisy, and wavelet analysis offers new ways of data decomposition into its noise and signal.