

# From Local to Global: Multi-Scale Networked Systems Modeling, Analysis, and Control

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ECE Department Seminar  
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## Abstract

Rapid development of technology is quickly leading us to an increasingly networked and wireless world. As a result, connecting any two "things" or people on Earth today has never been easier. The concept of "going viral" didn't even exist 50 years ago, but now is the ultimate goal for many advertising companies or TikTok users alike. But besides just trying to understand why a show like Squid Game can become a worldwide sensation seemingly overnight, this talk explores more generally how individual/local actions manifest into different macroscopic/global properties. More specifically, we look at the pervasiveness and ubiquity of "networks" and the challenges that come with predicting and controlling various processes on complex systems. In particular, we look at how agent-level interactions in a system lead to macroscopic structural-level changes to the same system and co-evolve in seemingly unpredictable ways.

How can a single CEO manage an organization with 100,000+ employees? How much influence does the President of the United States have over the 320+ million people in the country? How does a flock of birds make collective decisions without a leader? How exactly do the actions of the individual agents drive the manifestations of the collective? After showing how similar all these seemingly different examples really are, we will focus on two specific problems my group is currently working on and how these connections are guiding our approach:

1. How to prevent a global pandemic.
2. How to control a million robots.

## Biography



Dr. Cameron Nowzari is an Assistant Professor in the Electrical and Computer Engineering Department at George Mason University. He received his B.S. in Mechanical Engineering in June 2009 from the University of California, Santa Barbara, and his Ph.D. in Engineering Sciences in Sept 2013 from the University of California, San Diego. He spent three years as a postdoc in the Electrical and Systems Engineering Department at the University of Pennsylvania until joining Mason in 2016. He was with the Air Force Research Laboratory at the Wright-Patterson Air Force Base as a Summer Faculty Fellow in 2019, working with the Aerospace Systems directorate.

Dr. Nowzari's research interests are highly transdisciplinary in the broad areas of controls, robotics, emergence, and autonomy. His work has applications in a wide number of areas including mobile sensors, autonomous robots, resource allocation, public health and epidemiology, network protection, and marketing campaigns. He has received multiple best paper awards from different venues and his work is currently supported by the National Science Foundation and the Office of Naval Research including a Young Investigator Program Award.