Industrial and Systems Engineering Seminar

Dynamic Network Interdiction: Bounds and Optimal Algorithms

Wednesday, October 14

3:15 PM – Refreshments before the Seminar

3:30 PM – Graduate Seminar

Mechanical Engineering Room 4125 A & B

Professor Cole Smith

Professor

Industrial Engineering Departmetn

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This talk discusses collaborative work between the presenter and Dr. Jorge Sefair, an assistant professor at Arizona State University. We study two dynamic network games between an attacker and a user. In the first, the user seeks a shortest path between a pair of nodes in a network, and the attacker seeks to interdict a subset of arcs to maximize the user's shortest-path cost. The attacker can interdict arcs any time the user reaches a node in the network, and the user responds by dynamically altering its chosen path. The challenge is to find an optimal path, coupled with the attacker's optimal interdiction strategy. We propose an exact exponential-state dynamic-programming algorithm for this problem, along with algorithms that produce lower and upper bounds on the optimal objective. A second problem examines a similar problem in dynamic assignment problems. Interestingly, while the shortest-path variant is polynomially solvable when the interdictor can attack only one arc, the assignment variation becomes strongly NP-hard when the interdictor has a single assignment that can be interdicted.

BIO: Dr. J. Cole Smith is Professor and Chair of the Industrial Engineering department at Clemson University. He served in the Industrial and Systems Engineering department at the University of Florida (UF) from 2005-2014, serving as a Full Professor from 2010-2014 and as Interim Department Chair in the 2013-2014 year. While at UF, he also served as the founding Interim Director of the UF Informatics Institute, a university-wide initiative that oversaw interdisciplinary endeavors in hiring and joint internal funding opportunities. His research, which has been supported by the NSF, DARPA, AFOSR, DTRA, and the ONR, regards combinatorial optimization models and algorithms. Dr. Smith's awards include the Young Investigator Award from the ONR, the Hamid K. Elden Outstanding Young Industrial Engineer in Education award, the Operations Research Division Teaching Award, the 2014 Glover-Klingman prize for best paper in Networks, and the best paper award from IIE Transactions in 2007.