Devendra Shelar

Center for Computational Engineering
Massachusetts Institute of Technology
77 Massachusetts Ave., Cambridge, MA 02139

E-mail: shelard@mit.edu
Phone: +1 (857) 253-8964
URL: www.mit.edu/~shelard/

Education

Massachusetts Institute of Technology (MIT), Cambridge, MA

Ph.D. Candidate in Computational Science and Engineering, expected in June 2019, GPA: 4.8/5

Thesis title: Improving Resilience of Electricity Networks against Cyberphysical Failures

Committee: Saurabh Amin (advisor), Ian Hiskens (EECS), Ali Jadbabaie (IDSS/CEE), Carolina Osorio (CEE/ORC), Konstantin Turitsyn (MechE), Audun Botterud (LIDS)

M.S. in Transportation, February 2016, GPA: 4.8/5

Indian Institute of Technology, Bombay, India

B. Tech., M. Tech. in Computer Science and Engineering, August 2012, GPA: 8.34/10

Thesis title: SketchRail - Railway Network Configuration Editor

Thesis advisors: Abhiram Ranade, Narayan Rangaraj

Research Interests

Network and Combinatorial Optimization
System Security and Interdiction
Resilience of Electricity Networks
Post-Disaster System Restoration

Academic Publications

Journal Articles (published or submitted)

"Resilience of Electricity Distribution Networks - Part I: Cyber-physical disruption models," with Saurabh Amin and Ian Hiskens. Submitted to *IEEE Transactions of Power Systems*, 2018.

"Resilience of Electricity Distribution Networks - Part II: Leveraging Microgrids," with Saurabh Amin and Ian Hiskens. Submitted to *IEEE Transactions of Power Systems*, 2018.

"Security Assessment of Electricity Distribution Networks under DER Node Compromises," with Saurabh Amin. *IEEE Transactions on Control of Networked Systems*, 2016.

Book Chapter

"Towards Resilience-Aware Resource Allocation and Dispatch in Electricity Distribution Networks," with Saurabh Amin and Ian Hiskens. *Book chapter in Springer/IMA volume on The Control of Energy Markets and Grids*, 2017.

Articles in Preparation

"Leveraging DERs and Microgrids against Storm-induced Failures for Resilient Distribution Networks," with Derek Chang and Saurabh Amin. Targeted for *IEEE Transactions of Power Systems*, 2019.

Refereed Conference Proceedings

"Strategic DER Deployment and Line Repair Scheduling for Storm-induced Failures in Distribution Networks," with Derek Chang and Saurabh Amin. *IEEE SmartGridComm*, Aalborg, 2018.

"Compromising Security of Economic Dispatch in Power System Operations," with Pengfei Sun, Saman Zonouz and Saurabh Amin. *Dependable Systems and Networks*, 2017.

"A Distributed Strategy for Electricity Distribution Network Control in the face of DER Compromises," with Jairo Giraldo and Saurabh Amin. *Conference on Decision and Control*, Osaka, 2015.

"Analyzing Vulnerability of Electricity Distribution Networks to DER Disruptions," with Saurabh Amin. *American Control Conference*, 2015.

Honors and Awards

2007 All India Rank 69 in IIT-Joint Entrance Exam out of over 250,000 candidates

2007 All India Rank 55 in All India Engineering Entrance Exam out over 650,000 candidates

2007 CBSE Merit Scholarship

2018 MIT Schoettler Scholarship Fund

Presentations

Towards Improving the Resilience of Power Systems, presented at:

Los Alamos National Laboratory Seminar, Los Alamos, NM, August 2018

Applications of Bilevel Mixed-Integer Programming to Power Systems Resilience, presented at:

Industrial Engineering and Operations Research Seminar, IIT, Bombay, India, January 2018

Quantifying Resilience of Electricity Distribution Networks to Cyberphysical Disruptions, presented at:

Nexus Energy Seminar, MIT, December 2017

Compromising Security of Economic Dispatch in Power System Operations, presented at:

Dependable Systems and Networks, Denver, June 2017

Vulnerability Analysis of Optimal Power Flow Problem under Cyberphysical Security Attacks, presented at:

INFORMS Annual Meeting, Nashville, TN, November 2016

A Decentralized Strategy for Electricity Distribution Network Control under DER disruptions, presented at:

Conference on Decision and Control, Osaka, Japan, December 2015

Analyzing Vulnerability of Electricity Distribution Networks to DER disruptions, presented at:

American Control Conference, Chicago, IL, July 2015

Research Experience

2013 - Present

Massachusetts Institute of Technology, Cambridge, MA

Graduate Research Assistant

Advisor: Prof. Saurabh Amin

Developing network interdiction algorithms for smart electricity networks. Designing proactive resource allocation and response strategies for strategic as well as weather-induced failures. Collaborations with Prof. Ian Hiskens, Prof. Saman Zonouz, Los Alamos National Laboratory, Electric Power Research Institute & EDF Electricity Company.

Summer 2018

Los Alamos National Lab, Losa Alamos, NM

Graduate Research Intern

Supervisors: Nathan Lemons, Andrey Lokhov, Sidhant Misra

Developed algorithm for online learning of power transmission dynamics from partial Phasor Measurement Unit (PMU) observations.

2012 - 2013

Indian Institute of Technology, Bombay, India

Research Assistant

Advisors: Abhiram Ranade, Narayan Rangaraj

Developed scheduling algorithms for rail transportation networks. Designed and implemented simulation model for evaluating robustness of the rail schedules.

Personal, Skills

Citizenship: India

Languages: English, Hindi, Marathi

Computer Skills: C++, Java, Julia, Matlab, LaTeX

Interests: Indian classical vocals, Guitar

References

Saurabh Amin
Associate Professor
Department of Civil and Environment Engineering
MIT
Cambridge, USA
phone: *(617) 253-8003*
e-mail: *amins@mit.edu*

Ian Hiskens
Professor
Department of Electrical Engineering and Computer Science
University of Michigan
Ann Arbor, MI, USA
phone: *(734) 615-7076*
e-mail: *hiskens@umich.edu*

Saman Zonouz
Associate Professor
Department of Electrical and Computer Engineering
Rutgers University
Newark, USA
phone: *(217) 721-8280*
e-mail: *saman.zonouz@rutgers.edu*

Narayan Rangaraj
Professor
Department of Industrial Engineering and Operations Research
IIT Bombay
Mumbai, India
phone: +91 (22) 2576-7882
e-mail: narayan.rangaraj@iitb.ac.in

December, 2018