

Dan Li

Ph.D. Candidate
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CURRENT POSITION	Graduate Student Instructor ISYE 3770 Statistics and Applications Georgia Institute of Technology, Atlanta, GA	Jan 2021 – May 2021
EDUCATION	Georgia Institute of Technology , Atlanta, GA Ph.D. in Industrial Engineering (Minor: Machine Learning) Advisors: Prof. Nagi Gebraeel, Prof. Kamran Paynabar Georgia Institute of Technology , Atlanta, GA M.S. in Statistics Tsinghua University , Beijing, China B.S. in Mechanical Engineering University of Toronto , Toronto, ON Exchange Student	Aug 2015 – May 2021 (Expected) Aug 2020 Aug 2011 – Jul 2015 Jan 2014 – Apr 2014
HONORS AWARDS	Best Student Paper Award (Finalist) Data Analytics and Information Systems (DAIS), IISE Annual Conference Travel Grant (RSA Conference) NSF I-Corps Program, VentureLab CIRTL Associate Teaching Certificate Center for the Integration of Research, Teaching and Learning Best Student Paper Award Energy Systems, IISE Annual Conference Best Student Paper (Runner-Up) Data Analytics and Information Systems (DAIS), IISE Annual Conference Best Student Poster (Second Prize) Student Poster Competition, Georgia Tech Annual Cybersecurity Summit Outstanding Thesis Award Tsinghua University Undergraduate Fellowship Tsinghua University	2020 2020 2020 2019 2019 2019 2015 2011-2015
RESEARCH INTERESTS	Statistical Machine Learning and Data Science for Cybersecurity of Cyber-Physical Systems; IoT-enabled Manufacturing Processes; Industry 4.0; Complex System Modeling; Diagnosis and Reliability Engineering	
PUBLICATIONS	Journal Papers Published or Accepted <ul style="list-style-type: none">• Dan Li, Nagi Gebraeel, and Kamran Paynabar, Detection and Differentiation of Replay Cyberattack and Equipment Faults in SCADA Systems, <i>IEEE Transactions on Automation Science and Engineering</i>, DOI: 10.1109/TASE.2020.3013760.,<ul style="list-style-type: none">- Winner of Best Student Paper Award in Energy Systems, IISE Annual Conference 2019- Runner-up of Best Student Paper Award in Data Analytics and Information Systems (DAIS), IISE Annual Conference 2019- Second Prize of Student Poster Competition, Georgia Tech Annual Cybersecurity Summit 2019• Dan Li, Kamran Paynabar, and Nagi Gebraeel, A Degradation-Based Detection Framework Against Covert Attacks in SCADA Systems, <i>IISE Transactions</i>, DOI: 10.1080/24725854.2020.1802537.,<ul style="list-style-type: none">- Finalist of Best Student Paper Competition in Data Analytics and Information Systems (DAIS), IISE Annual Conference 2020• Ana María Estrada Gómez, Dan Li, and Kamran Paynabar, An Adaptive Sampling Strategy for Online Monitoring and Diagnosis of High-dimensional Streaming Data, <i>Tentatively Accepted: Technometrics</i>	

**PUBLICATIONS
(CONTINUED)**

Journal Papers Under Review

- **Dan Li**, Nagi Gebraeel, Kamran Paynabar, and A.P. Sakis Meliopoulos, An Online Approach to Cyberattack Detection and Localization in Smart Grids, *Under review: IEEE Transactions on Smart Grid*
- Paritosh Ramanan, **Dan Li**, and Nagi Gebraeel, Decentralized Blockchain based Cyber Attack Detection on Large Scale Power Systems, *Under review: IEEE Transactions on Industrial Informatics*
- Kavya Ashok, **Dan Li**, Deepak Divan, and Nagi Gebraeel, Online Detection of Inter-turn Winding Faults in Single-Phase Distribution Transformers Using Smart Meter Data, *Major revision: IEEE Transactions on Smart Grid*

Conference Papers Published or Accepted

- **Dan Li**, Paritosh Ramanan, Nagi Gebraeel, and Kamran Paynabar, Deep Learning based Covert Attack Identification for Industrial Control Systems, 19th *IEEE International Conference on Machine Learning and Applications (ICMLA), 2020*
- Kavya Ashok, **Dan Li**, Deepak Divan, and Nagi Gebraeel, Distribution Transformer Health Monitoring using Smart Meter Data, *Proceedings of 2020 IEEE PES Innovative Smart Grid Technologies Conference (ISGT)*

Working Paper

- **Dan Li**, Nagi Gebraeel, and Kamran Paynabar, Cyberattack Detection and Diagnosis in ICS Using LSTM, *Target Journal: Reliability Engineering & System Safety*
- **Dan Li** and Nagi Gebraeel, Manifold Learning Based Prognostics for Multiple Failure Modes, *Target Journal: Reliability Engineering & System Safety*

**RESEARCH
EXPERIENCE**

Differentiating Cyberattacks from Equipment Faults Using IOT Sensor Data

- Developed a detection and differentiation framework for replay attack and four typical equipment faults and derived different statistics that generate unique signatures which differentiate replay attack from the equipment faults. (Journal Publication)
- Developed a detection methodology against covert attacks in SCADA systems using degradation signals and derived the different characteristics of the degradation signals generated by the system under covert attack and under normal operations. (Journal Publication)
- Designed and conducted physical experiments on a rotating machinery setup that verifies the applicability of our method.

Localizing Cyberattacks in Complex Networks Using Statistical and Deep Learning

- Developed a detection methodology against covert attacks on regional control centers in a smart grid and combined sparse group Lasso and state estimation to detect and locate covert attacks on power generators. (Journal Submission)
- Developed a deep learning based framework to detect, localize, and diagnose cyberattacks on one of the generators in a smart grid. (Conference Publication)

Blockchain-Based Decentralized Cyberattack Detection for Large Scale Power Systems

- Co-developed a privacy-preserving cyber attack detection framework using blockchain technique to detect coordinated attacks in power systems. (Journal Submission)
- Implemented the proposed framework on an Ethereum based private blockchain network to demonstrate its scalability and applicability for varying degrees of cyber threat parameters.

Adaptive Sequential Sampling and Diagnosis Based on Tensor Completion

- Co-developed an adaptive sampling method to recover information and detect anomalies from incomplete data using tensor completion techniques. (Journal Publication)

Fault Detection in Power Systems (DOE-SNESE Project)

- EV and solar detection: Designed an algorithm that utilizes transformer load profiles for detection and estimation of downstream EV charging and solar power generation.
- Feeder-level fault detection: Used machine learning techniques to detect and classify the type of faults that occur at power distribution systems with feeder level voltage data.
- Transformer health monitoring: Co-developed algorithms that detect and estimate the degradation of distribution transformers based on turns ratio changes and the power network topology. (Conference Publication, Journal Submission)

Automated Failure Mode Detection and Prognosis (NASA-HOME Project)

- Applied manifold learning and transfer techniques to enable failure mode classification based on poorly-labeled high-dimensional sensor network data.
- Automate failure mode classification and new failure mode identification based on streaming high-dimensional sensor data to enable system self-awareness.

TEACHING EXPERIENCE	<p>Graduate Student Instructor Jan 2021 – May 2021 ISYE 3770 - Statistics and Applications Full instructor, 78 students, online-synchronous course Delivered lectures 3 hrs per week; Designed assignments and exams; Held weekly office hours</p> <p>Teaching Assistant May 2020 – Aug 2020 ISYE 6414 - Regression Analysis</p> <p>Guest Instructor Mar 2019 ISYE 4803 - Reliability Engineering</p>
PROFESSIONAL EXPERIENCE	<p>Session Chair: Crime Prediction, Prevention, and Control, <i>IISE Annual Conference 2018</i> Session Chair: Statistical Methods for Cybersecurity of Cyber-Physical Systems, <i>INFORMS Annual Conference 2020</i></p> <p>Invited talk: Detection and Distinction of Replay-Attack and Equipment Faults in SCADA - IISE 2019 Annual Conference, Orlando, FL, 2019 - INFORMS 2019 Annual Meeting, Seattle, WA, 2019</p> <p>Invited talk: A Degradation-Based Detection Framework Against Covert Attacks in SCADA Systems, - INFORMS 2019 Annual Meeting, Seattle, WA, 2019 - IISE Annual Conference 2020 (Virtual)</p> <p>Invited talk: An Online Approach to Cyberattack Detection and Localization in Smart Grids, - IISE Annual Conference 2020 (Virtual) - INFORMS Data Mining Workshop 2020 (Virtual) - INFORMS 2020 Annual Meeting (Virtual)</p> <p>Journal Referee - Journal Of Quality Technology (JQT) - IEEE Transactions on Automation Science and Engineering (TASE)</p>
REFERENCES	<p>Prof. Nagi Gebraeel (Ph.D. Advisor) Georgia Power Professor H. Milton Stewart School of Industrial and Systems Engineering Georgia Institute of Technology Email: nagi.gebraeel@isye.gatech.edu</p> <p>Prof. Kamran Paynabar (Ph.D. Advisor) Fouts Family Early Career Professor and Associate Professor H. Milton Stewart School of Industrial and Systems Engineering Georgia Institute of Technology Email: kamran.paynabar@isye.gatech.edu</p> <p>Prof. Jianjun Shi (Thesis Committee Member) Carolyn J. Stewart Chair and Professor H. Milton Stewart School of Industrial and Systems Engineering Georgia Institute of Technology Email: jianjun.shi@isye.gatech.edu</p> <p>Prof. A.P. Meliopoulos (Thesis Committee Member) Professor; Georgia Power Distinguished Professor School of Electrical and Computer Engineering Georgia Institute of Technology Email: sakis.m@gatech.edu</p>