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Department of Civil Engineering

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Dr. Wei Ma

Assistant Professor

Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University

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ZOOM LINK: Meeting ID: 950 8981 9867; Passcode: 860265

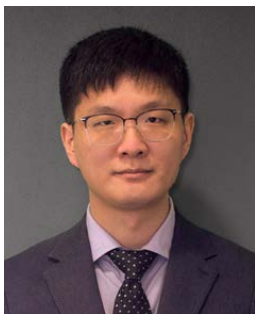
<https://stonybrook.zoom.us/j/95089819867?pwd=NzdKQUJXU3J3NFN4VlpBUlp4bDFhUT09>

Cybersecurity challenges in smart transportation systems: Two exploratory studies

Abstract

The rapid advancements of the Internet of Things (IoT), machine learning (ML), and artificial intelligence (AI) have catalyzed the development of smart transportation systems. Various applications, such as personalized route guidance and traffic control systems, have been extensively studied and widely deployed over the globe. By heavily relying on real-time, multi-source, and accurate information, ML and AI-based system solutions are smart and efficient. However, ML and AI can be a double-bladed sword, as many recent studies revealed the vulnerability issues of ML and AI models under falsified information or adversarial attacks. This presents cybersecurity challenges in smart transportation systems. To the best of our knowledge, few studies have investigated this issue. In this talk, we present two recent exploratory studies to evaluate the effect of cyber-attacks in the following two scenarios: 1) a hacker selects and attacks a small set of road segments to degrade the overall performance of the graph neural network-based traffic prediction systems; 2) a group of vehicles cooperatively send falsified information to “cheat” deep reinforcement learning-based traffic signal systems in order to save their total travel time. Both studies could help to improve the reliability and robustness of ML and AI-based applications and better protect the smart mobility systems.

About the Speaker:



Dr. Ma is currently an assistant professor with the Department of Civil and Environmental Engineering at the Hong Kong Polytechnic University (PolyU). He received bachelor's degrees in Civil Engineering and Mathematics from Tsinghua University, China, master's degrees in Machine Learning and Civil and Environmental Engineering, and Ph.D. in Civil and Environmental Engineering from Carnegie Mellon University, USA. His research focuses on the intersection of machine learning, data mining, and transportation network modeling, with applications for smart and sustainable mobility systems. He receives awards for research excellence and his contributions to the area, including the 2020 Mao Yisheng Outstanding Dissertation Award, and best paper award (theoretical track) at INFORMS Data Mining and Decision Analytics Workshop. Dr. Ma is now serving in the Early Career Editorial Advisory Board on Transportation Research Part C: Emerging Technologies.