UNIVERSITY OF MARYLAND

WORKSHOP

CALL FOR PAPERS

Cyber Resilience and Quantum Computing in Railway Engineering and Operations

MARCH 7TH-8TH, 2023

University of Maryland
Kim Building, College Park MD

March 7th: 1:00pm - 5:00pm

March 8th: 8:30am - 4:30pm

ABOUT

The past decade has witnessed the rapid advancement of digital technology and cyber issues due to the explosive growth of data and recent breakthroughs in artificial intelligence, as well as the subfield of machine learning. These breakthroughs continue to generate value across different domains of railway engineering and operations. The most pressing problems arise from data storage, data sharing, privacy, and cyber-related concerns, due to the digital nature of the information and data being collected. Railway transportation in the future will contribute significantly to mobility; therefore, digitalization, cybersecurity, and artificial intelligence are key to higher capacity and passenger satisfaction. Rail cybersecurity is a fundamental requirement for smooth and safe operations. The increased connectivity and digitalization of rail systems and the heavy dependence on new technology, such as the Internet of Things (IoT), sensors and tools, has created cyber vulnerability of rail systems and operations to cyber-attacks.

Railway operations involve a range of scheduling activities, from operational train dispatching to provisional timetables. Incorrect decisions can have a serious impact on operations and safety. Quantum computing in railway engineering and operations is relatively new, and its formulation and analysis is at an early stage. The future use of digital twins in railway track engineering is very promising. It provides a computational that evolves over time to persistently represent the railway structure and its components, systems, and processes. Digital twins underpin intelligent automation by supporting data-driven decision making and enabling asset-specific analysis and system behavior. Within the context of railway systems, digital twins represent the flow of information among connected platforms and the central clearing house for data and visualization. As railway agencies convert to digital twin capabilities, agencies have to migrate towards continuous real-time railway data models and calibrate by pairing data from real-time sensors, meters, and weather. Little research and fewer efforts have so far taken place to exploit the hierarchical relationship between systems in an integrated way. This area is ripe for quantum computation processes. A simulation may be used to optimize the configuration of the railway systems and components.

Suggested Topics

- Data Sharing and Railway Maintenance and Operations
- Theory-Guided Machine Learning
- Digital Twins in Railway Track Engineering
- Quantum Computing and Information in Railway Operations
- Blockchain Applications
- Detecting Cyberattacks in Railway Systems
- Adapting Cybersecurity to Rail Environments
- Applications

IMPORTANT DATES:

SUBMISSION OF ABSTRACT

January 25th, 2023

NOTIFICATION OF ACCEPTANCE

February 7th, 2023

WORKSHOP DATE

March 7th-8th, 2023

Abstracts must be presented clearly in English. Electronically submit papers to niiokine@umd.edu

Questions? Contact Prof. Nii Attoh-Okine niiokine@umd.edu

Call for Sponsors:

The University of Maryland **Digital and Cyber Center for Railway Engineering and Operations** workshop is soliciting sponsorships for the conference to provide scholarship and travel for students to attend, reception sponsors and other expenses for the workshop.

Sponsors:

[Platinum] at $2,000

[Gold] at $1,000

[Silver] at $750

Technical Research and Industry Contributions

- Full paper: Accomplished research results (6 pages)
- Short paper: Work in progress/fresh development (3 pages)
- Authors of selected full papers (after the workshop) will be invited to submit them for possible inclusion in a Special Issue in IEEE journal.