

## **Day 1: Wednesday December 11, 2024**

### **9:00 -9:30 Session I: Welcome and Introduction**

**Allan M. Zarembski**, Professor, Director, Railroad Research and Safety Program, University of Delaware

**Anne Canby**, Founder, OneRail and Chair of the Railroad Advisory Board at University of Delaware

**Dennis Assanis**, President, University of Delaware

### **9:30 Keynote Speaker:** Karen Hedlund, Vice Chair of the U. S. Surface Transportation Board

**Introduction:** **Anne Canby**, Chair of the Railroad Advisory Board at University of Delaware

### **9:50-12:00 Session II: Railroad and FRA Big Data Applications and Safety**

Session Chair: **Allan M. Zarembski**, **University of Delaware**

**Ranjan Dash**, Sr. Manager, Engineering Analytics, BNSF Railway, and **Charity Duran** Director of Data Engineering and Analysis “Challenges of GIS data quality in track measurements - how to overcome”

**Aarron Brown**, Union Pacific Railroad and **Zach Garner** Visiostack, “Leveraging Data in a Freight Railroad”

**Soheil Saadat and Michael Trosino**, Amtrak, **Richard Fox-Ivey**, PrecisionTrack Inspection Inc., “Enhanced Visual Track Inspection from Hi-Rail Vehicles”

**Patrick Johnson, Andrew LaBounty, Ruby Li, Tony Ye, and Emily Grenzke**, Team from Data Analysis and GIS Division in FRA, “Improvements in Data Collection and Linkage for Risk Modeling in Railroad Safety Inspection Programs”

**Warren Randolph**, Chief Data Officer, National Transportation Safety Board, "Data-Driven Insights: How Rail Incident Analysis Shapes Safety Recommendations."

12:00 to 1:00 - Lunch

### **1:00-3:00 Session IIIA: Big Data Applications and Case Studies: Railway Asset Management**

Session Chair: **Anne Canby** (Chair- Railroad Advisory Board, Univ of Delaware)

**Megan France-Peterson**, Engineering Psychologist, U.S. DOT Volpe National Transportation Systems Center, “How Human-Centered Design Can Address Challenges Associated with Automation and Big Data: An Automated Track Change Detection Use Case”

**Kenza Soufiane**, Data Scientist, Loram Technologies, “Crosstie Degradation Factors: Data-Driven Insights on the Adzing’s Impact”

**Samantha Kirkpatrick**, ENSCO, Inc. “From data to Action: Using Cellular Analytics to Identify Rail Trespass Hotspots”

**Chris Griffiths, Pedro Teixeira, Ramesh Sah and Yunbo Hou**, Humatics Corporation, “Autonomous Field-Data Alignment using GNSS-Aided Inertial Navigation System (INS)”

**Michael Palese**, Amtrak, “Classifying Measured Rail Profiles using Supervised Machine Learning”

3:00 to 3:15 - Break

### **3:15 -5:00 Session IIIB: Big Data: Applications and Case Studies:**

Session Chair: **Dave Staplin**, HNTB

**Saeed Goodarzi** , HNTB and **Hugh Thompson**, FRA, “Advanced Prediction of Track Degradation Rates Using GPR, LiDAR, and Geometry Data.”

**Kevin Garben**, Director Of Technical Services, RailWorks Corporation, “ Leveraging Experience and Technology to Plan Track Maintenance”

**Shawn Bernard**, Tetra-Tech, “Advanced data analytics of Satellite SAR and Multispectral imagery for real-time alerting of water hazards”

**Leonidas Kontokostas**, MerMec, Multi-Vendor Diagnostic Fleet Visual Data Fusion to Enhance Root-cause Analysis and Support Prescriptive Maintenance

5:00 Day 1 sessions end

6:00 – 8:00 Cocktail Reception: Trabant Student Center; Trabant Multipurpose Room B/C,

**Day 2: Thursday, December 12, 2024**

**8:30- 10:30 Session IIIC: Applications and Case Studies:**

Session Chair: **Joseph Palese**, University of Delaware

**Yunbo Hou**, **Aaron Whittemore**, **Chris Griffiths**, Humanics Corporation, “Deploying Humatics Focus Track Monitoring at New Jersey Transit: Challenges and Benefits for Transit Operators”

**Petra Holeckova** and **Tim Flower**, KONUX GmbH, " Predictive Maintenance of Turnouts - Reconstructing the wheel-rail trajectory over railroad frogs at scale”

**Erez Abittan**, Rail Sector Lead, Palantir Technologies, “Data Driven Maintenance Planning: Beyond the Forecasting Models”

**Morteza Mirzaei**, **Jeff Warfford**, **Carvel Holton**, and **Mehdi Ahmadian**, **Virginia Tech**, “ From Data to Information: The Twists and Turns of Assessing Track Stability”

**Arthur de Oliveira Lima** and **J. Riley Edwards**, University of Illinois Urbana Champaign, “Buckle Risk Assessment Leveraging Existing and Emerging Railway Track Inspection Data”

10:30 – 10:45 Break

**10:45- 12:30 Session IV: Big Data Analysis Theory and Techniques**

Session Chairman: **Monique Head**, University of Delaware

**Asim Zaman** and **Huixiong Qin** Rutgers University, “Artificial Intelligence Aided Stopped on Tracks Analysis: A Case Study on the Effects of Dynamic Envelope Pavement Markings”

**Piero Caputo**, **Jeremiah Dzeble**, **Monique Head** , University of Delaware “Multi-Point Vision-based Wayside Monitoring to Estimate Track Moduli”

**Hai Huang**, **Yuliang Zhou** and **Qifeng Yang**, Penn State University-Altoona, “Railroad Track Modulus Estimation Using Distributed Acoustic Sensing”

**Abel Ayele**, Amtrak and **Joseph Palese**, University of Delaware, “Development of a Comprehensive Classification Model for Railway Track Geometry Condition Severity Based on Both Safety and Ride Quality”

**Matthew Dick** , ENSCO, “Center for Hands-on Training and Learning Environment for the Next Generation Railroad Technical Workforce - HTL Center”

12:30 Concluding Remarks

**Allan M. Zarembski**, Professor, University of Delaware

**Anne Canby**, Chair of the Railroad Advisory Board at University of Delaware

12:45 PM Program Ends



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**“Big Data” in Railroad Maintenance Planning 2024**  
**University of Delaware**  
**Newark, DE**  
**December 11-12, 2024**

*Converting the “Mountain” of Data Collected by Railway Systems into Effective Maintenance Planning Information with a Focus on Railway Needs and Practical Applications*

Sponsored by:

University of Delaware’s Railroad Engineering and Safety Program  
University of Delaware’s Department of Civil and Environmental Engineering  
RailTeam University Transportation Center, U.S. Department of Transportation

Modern Railways are making increasing use of new generation track inspection and operating technology to obtain more and more data on the condition of the track and equipment. This extensive amount of data, which includes data of increasing complexity as well as volume, has led to a condition known as “Big Data”, where the volume of data is such that traditional analysis techniques are no longer viable to efficiently make use of all of this large volume of data. Thus, important information is often buried in this “mountain” of data. Since railways need to convert this data into useable information to help them plan their capital maintenance programs, there is a need for the application of new and improved analysis techniques to make this conversion from data into information. One such area of improved data analysis is the use of “Big Data” statistical analysis techniques.

The 2024 conference is intended to expand on previous years’ conferences and introduce these new and emerging analysis techniques and to show how they can be applied to the large volume of inspection data collected by railways to improve their planning of the critical capital and maintenance programs. This year’s conference focuses on the railway’s specific needs and practical applications to date of “Big Data” analytics to include both infrastructure and rolling stock maintenance planning.

