Converting the mountain of data collected by railway systems into effective maintenance planning information with a focus on railway needs and practical applications

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University of Delaware Railroad Engineering and Safety Program
University of Delaware Big Data Center
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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. Others include improved engineering modeling and more traditional statistical analysis techniques.

The 2018 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.
DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING

BIG DATA IN RAILROAD MAINTENANCE PLANNING

DAY 1: THURSDAY, DECEMBER 13, 2018

8:00-8:30 AM
SESSION I: WELCOME AND INTRODUCTION

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

Dennis Assanis | President, University of Delaware

Charles Riordan | Professor, Vice Provost for Research, University of Delaware

Sue McNeil | Chair, Department of Civil and Environmental Engineering, University of Delaware

David Staplin | Deputy Chief Engineer Amtrak (retired), consultant to HNTB, and Chairman of the Railroad Advisory Board at University of Delaware

8:30-10:05 AM
SESSION IIA: RAILROAD AND FRA BIG DATA APPLICATIONS AND NEEDS

SESSION CHAIR: Allan M. Zarembski | University of Delaware

J. Ken Fuller | Manager of Engineering Field Technology, CN Rail

Michael Messner | Assistant Director of Roadway Planning, and Shawn Tubbs | BNSF

J. Shane Rice | Assistant Chief Engineer MW&S and Mabby Amouie | Senior Manager of Advanced Analytics, Norfolk Southern Railway, “Norfolk Southern’s Rail Wear Prediction Using Artificial Intelligence and Machine Learning”

Jay Baillargeon | Program Manager, FRA, “Update on FRA’s Predictive Analytics Research”
10:05–10:20 AM
BREAK

10:20 AM–12:00 PM
SESSION IIB: RAILROAD AND FRA BIG DATA APPLICATIONS

SESSION CHAIR: David Staplin | Chairman of the Railroad Advisory Board at University of Delaware

Milad Hosseinipour | Amtrak

Hugh Thompson, FRA, Sajjad Meymand and Radim Bruzek | ENSCO, Inc., “Data Analysis Methods for Fouled Ballast Waiver”

Ricardo J. Quirós-Orozco, J. Riley Edwards, Marcus S. Dersch | University of Illinois at Urbana-Champaign and Steven Melnick | Amtrak, “The Application of Big Data to the Design of Optimized Concrete Crossties for a Shared Corridor Operations”

12:00–1:15 PM
LUNCH

1:15 PM
KEYNOTE SESSION:
INTRODUCTION: Allan M Zarembski | University of Delaware

KEYNOTE SPEAKER
Honorable Ronald Batory | Administrator, US Federal Railroad Administration

1:45–3:30 PM
SESSION III-A: BIG DATA: APPLICATIONS AND CASE STUDIES:
RAILWAY INFRASTRUCTURE ASSET MANAGEMENT

SESSION CHAIR: Todd Euston | Vice President Engineering, Georgetown Rail (GREX)

Erland Tegelberg | Strukton Rail, “Effective Asset Management and Exciting New Big Data Sources”

Lariza Stewart and Stuart Pagliuco | GREX, “An Artificial Intelligence Approach to Aligning Historical Railroad Data”

Leonidas Kontokostas | Italy, “Big Data Integration and Analysis for Driving and Prioritizing Rail Replacements”

Farrokh Jazizadeh Karimi, Milad Afzalan, Mehdi Ahmadian | Virginia Tech “Determining Track Condition from Onboard Data in Revenue Service through Machine Learning: Fondest Hopes, Wildest Dreams”

3:30–3:45 PM
BREAK

3:45-5:30 PM
SESSION IIIB: BIG DATA: APPLICATIONS AND CASE STUDIES: ROLLING STOCK ASSET MANAGEMENT

SESSION CHAIR: Joseph Palese | University of Delaware

Timothy Thompson | Uptake, “Utilizing Artificial Intelligence on ERP Data to Increase Rolling Stock Maintenance Efficiency

Cathy Herb | Director of Central Services and Ana-Maria Giuglea | Sr Manager, Advanced Analytics & Data Solutions, RailInc, “From Hadoop to Machine Learning - Railinc’s journey to enhancing data-driven apps through Advanced Analytics”

Nicolas Flix | Maintenance Engineering Director, Alstom Transport, “Acquisition, Processing & Storage of Rolling-Stock CBM Data”

Trefor Williams | Professor, Rutgers University, and John Betak | Collaborative Solutions LLC, “Using Text and Data Analytics to Study Railroad Operations”

5:30 PM
DAY 1 SESSIONS END

6:30–8:00PM
COCKTAIL RECEPTION: ATRIUM, STAR CAMPUS, UNIVERSITY OF DELAWARE
DAY 2: FRIDAY, DECEMBER 14, 2018

8:00 AM
INTRODUCTION TO DAY TWO
Nii Attoh-Okine | University of Delaware “The Future of Blockchain Technology in Railway Track Engineering”

8:15-10:15 AM
SESSION III-C: BIG DATA ANALYSIS THEORY AND TECHNIQUES

SESSION CHAIR: Nii Attoh-Okine | University of Delaware

Katrina Smart and Daniel Einbinder | ENSCO, Inc., “Utilizing Bayesian Inference and Machine Learning to Identify Risks to Railroads”

Nick van den Hurk | Fugro, Applied flexible train borne survey data for track maintenance and engineering”

Ankush Karnik | Project Manager and Steve Green, Data Visualization Lead, Volanno Inc., “Evolution of operational analysis using discrete data streams and big data approach: Case Study: Prediction of train arrival times”

Joshua Doran | Data Scientist, VisioStack Inc, “Leveraging UAV (Drone) Imagery to Support Planned Track Maintenance”

Luca Milani | DMA, “Data Management and Analysis of Infrastructure Measurements”, Italy

Joseph Palese | “Application of Data Analytics to Rail Wear Forecasting”, Senior Scientist, University of Delaware

10:15–10:30 AM
BREAK
10:30 AM-12:50 PM
SESSION IV: BIG DATA ANALYSIS THEORY AND TECHNIQUES

SESSION CHAIR: Qing He | SUNY Buffalo

Yuan Wang | Southwest Jiaotong University, China, “Position Synchronization for Track Geometry Inspection Data via Big-Data Fusion and Incremental Learning”

Howard J. Parkinson | Digital Rail Limited, UK, "Predicting Wheel Slides; A Big Data Approach"

Qing He | Associate Professor, Civil & Environmental Engineering, University at Buffalo, SUNY "Data-Driven Rail Defect Deterioration Modeling for Responsive Maintenance".

Xiang Liu | Assistant Professor, Rutgers University

12:50 PM
CONCLUDING REMARKS

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

David Staplin | Deputy Chief Engineer Amtrak (retired), consultant to HNTB, and Chairman of the Railroad Advisory Board at University of Delaware

1:00 PM
PROGRAM ENDS
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