2017 Rail Infrastructure and Vehicle Inspection Technology Conference

20-21 June 2017
University of Illinois at Urbana-Champaign
Urbana, IL

Preliminary Program
Become a conference sponsor today for your logo to appear on our website and in the final program. More information on supporter options and perks can be found here:

http://railtec.illinois.edu/RIVIT/2017/sponsors.php
Members of the Railroad Community,

The Rail Transportation and Engineering Center (RailTEC) at the University of Illinois at Urbana-Champaign is pleased to host the 2017 Rail Infrastructure and Vehicle Inspection Technology (RIVIT) Conference.

Our primary objective in organizing the 2017 RIVIT Conference is to facilitate the transfer of knowledge, as well as, to further communication and collaboration on the effectiveness of existing technologies and the development and implementation of new and emerging technologies with the potential to be applied to rail transportation.

The vitality of the conference program benefits from the excellent input provided by representatives from the railroads, engineering firms, rolling stock manufacturers, and supply firms who participate in the RIVIT Technical Planning Committee. This group considers topics of particular interest to the railroad industry, reviews the submitted abstracts, and selects presentations based on their quality, timeliness, and relevance. The goal is coverage of the broad array of current and emerging subjects of interest to railroads. An important criterion is innovative new ideas and results with potential to benefit and improve railroad practice. The RIVIT Technical Planning Committee has strived to achieve the proper balance with this year’s selection of presentations in the following topic areas:

- Infrastructure
- Rolling Stock
- Technologies
- Analytics

RIVIT provides a forum for attendees to meet with colleagues, clients, regulators, researchers, and other members of the railroad community. It is also an excellent opportunity to renew old acquaintances and make new contacts in the ever-changing railroad arena. We are hopeful that you will enjoy the technical presentations, research discussions, keynote presentation, and technical tour.

On behalf of RailTEC at the University of Illinois at Urbana-Champaign, we would like to extend an invitation to everyone interested in railroad performance, practices, and engineering to attend this year’s conference. We hope you can attend and look forward to meeting you.

Sincerely,

Christopher P. L. Barkan
C. Tyler Dick
J. Riley Edwards

Timothy Gress
Jim Lundgren
Preliminary Agenda Overview

**Tuesday**

8:00 - 9:40 Plenary Session  
9:40 - 10:05 Break  
10:05 - 12:10 Concurrent Sessions  
12:10 - 1:25 Lunch  
1:25 - 3:00 Concurrent Sessions  
3:05 - 3:30 Break  
3:30 - 5:10 Concurrent Sessions  
5:35 Reception  
7:15 Dinner

**Wednesday**

8:00 - 9:40 Concurrent Sessions  
9:40 - 10:05 Break  
10:05 - 11:45 Concurrent Sessions  
11:45 - 1:00 Lunch  
1:00 - 2:40 Concurrent Sessions  
2:40 - 5:00 Technical Tour  
5:00 Adjourn

**Technical Planning Committee**

Chris Barkan - University of Illinois  
Tom Bartlett - Union Pacific Railroad  
Bill Blevins - CN  
Gary Carr - Federal Railroad Administration  
Kevin Day - CN  
Tyler Dick - University of Illinois  
Riley Edwards - University of Illinois  
Todd Euston - GREX  
Bill Jacobs - CSX Transportation, Inc  
Jon Jeambey - TTX  
Brad Kerchof - Norfolk Southern Railway  
Pasi Lautala - Michigan Tech University  
Jim Lundgren  
Josh McBain - BNSF Railway  
Mike Mischke - BNSF Railway  
Dennis Morgart - BNSF Railway  
Henrique Reis - University of Illinois  
Conrad Ruppert - University of Illinois  
Bryan Schlake - Penn State Altoona  
Melody Sheahan - Association of American Railroads  
Reg Souleyrette - University of Kentucky  
Mike Trosino - Amtrak  
Brent Wilson - Amsted Rail  
Matt Witte - TTCI
**Meeting Location:**
Concurrent sessions will be held in the Yeh Center, 205 N. Mathews Ave., Urbana, IL 61801. (see page 11 for directions)

**Registration Desk:**
Registration will be held in the Yeh Center starting Tuesday, June 20th at 7:00am. All persons attending the conference will be required to register and pay the appropriate fee for registration. Please wear your badges to all sessions and activities.

**Registration Fees:**
- Regular Registration (before 6/8) $450.00
- Onsite Registration (after 6/8) $550.00
- Speaker Registration $350.00
- Government Registration $350.00
- Academic Registration $350.00
- 2-Day Parking $50.00

Additional information on registration can be found on our website: [http://railtec.illinois.edu/RIVIT/2017/registration_fees.php](http://railtec.illinois.edu/RIVIT/2017/registration_fees.php)

**Schedule:**
The conference program begins in the Yeh Center at 8:00am Tuesday morning. There will be a continental breakfast each morning. Lunch will be provided to all conference registrants on Tuesday and Wednesday.

**Attire:**
Recommended attire for the conference is “business casual.”

**Contact Information:**
Timothy Gress and Emma Ehrenhart
[http://railtec.illinois.edu/RIVIT/rivit.php](http://railtec.illinois.edu/RIVIT/rivit.php)
1239B Newmark Civil Engineering Laboratory
205 N. Mathews Avenue
Urbana, IL 61801
Phone: 217-300-1340, Fax: 217-333-9464
E-mail: rivit-con@illinois.edu
**Preliminary List of Topics**

**INFRASTRUCTURE**

**Practical use of UAS Technology for Inspection of Rail Infrastructure; Security, Trespassing and Theft Prevention**

- BNSF UAS Operations History and Current State with the Use of UAS in Railway  
  
  Mike Mischke *(BNSF)*

- Unlocking UAS for Linear Rail Inspection  
  
  James Licata *(Gryphon Sensors)*

- Use of Drone Photogrammetry in the Rail Industry  
  
  Antoine Martin *(Pix4D)*

- Small Unmanned Aircraft for Rail Infrastructure Inspection  
  
  Dennis Wierzbicki *(Unmanned Experts)*

- Evaluating the Integrity of Railway Corridor Using Remote Sensing  
  
  El Hachemi Bouali *(Michigan Tech University)*

**Autonomous Inspection Technologies and Inspection Solutions**

- Track Condition and Asset Mapping Using Automated Inspection Technologies  
  
  Lariza Stewart *(GREX)*

- Switch Point Inspection Gauges to Prevent Wheel Climb Derailments  
  
  Allan Zarembski *(University of Delaware)*

- Defects Detections of Railway Track Based On Time-Frequency Analysis By Using Bogie Acceleration Measurements  
  
  Xiukun Wei *(Beijing Jiaotong University)*

- Survival Analysis at Multiple Scales for Track Geometry Deterioration Modeling  
  
  Negin Alemazkoor *(University of Illinois at Urbana-Champaign)*

**Rail Flaw and Rail Weld Defect Detection**

- Dual Mode Sensor for Broken Rail Detection  
  
  Robert Knox *(Epsilon Lambda Electronics Corp)*

- Liquid Metal Assisted Cracking in Rail Welds
Preliminary List of Topics

David Workman (EWI)

Video-based Hand-held Measurement System for Automated Rail Inspection

Garbis Salgian (SRI International)

The Impact of Rail Defects on Track and Vehicle Response

Mohammad Fesharaki (FIU)

An Alternative Method for On-Site Rail Defect Detection During Replacement

Pasi Lautala (Michigan Tech University)

Bridge and Structural Inspection Advances

Total Reference-free Displacement of Bridges under Train Crossings

Fernando Moreu (University New Mexico)

Post Earthquake Resiliency Assessment of Railway Bridges

Scott Parr (California State University)

Remote Monitoring of Bridges Struck by Barges and Motor Vehicles

John Orsak (SENR Monitoring Technology)

Reference-Free Displacement Estimation with Wireless Smart Sensors for Railroad Bridge Performance Evaluation

Bill Spencer (University of Illinois at Urbana-Champaign)

Advancements in Crosstie Automated Inspection and Evaluation

Smart Prestressing System for Concrete Crossties

Bassem Andrawes (University of Illinois at Urbana-Champaign)

Tie Program Efficiency Gains with Technology Solutions

Jeb Belcher (Georgetown Rail Equipment Co.)

X-Ray Inspection of New Crossties

Michael Liesenfelt (Georgetown Rail Equipment Co.)

Ballast / Geotech

Characterization of Fouled Ballast Track Demonstration with Multiple Technologies

Radim Bruzek (Ensco)
Preliminary List of Topics

Condition Monitoring of In-Service Railway Ballast Using Machine Vision
  *Erol Tutumluer (University of Illinois at Urbana-Champaign)*

Monitoring Critical London Tube Tunnels With Wireless Tilt Meters
  *Paul Thurlow (Keller Getec)*

Real Time Monitoring of Specialty Geotechnical Construction Techniques on the Rail
  *Jeffrey Hill (Hayward Baker)*

Substructure Monitoring and Evaluation

Trackbed Inspection Technologies
  *James Hyslip and Hamed F. Kashani (Hyground)*

Monitoring Track Performance with Multiple Instrumentation Systems
  *Stephen Wilk (University of Illinois at Urbana-Champaign)*

Predicting Railroad Ballast Permeability through Laboratory Testing and Image Analysis
  *Erol Tutumluer (University of Illinois at Urbana-Champaign)*

Substructure Support Condition Back-Calculator
  *Marcus Dersch (University of Illinois at Urbana-Champaign)*

Track Inspection Vehicles; More Autonomy, More Data, More Information

FRA Autonomous Track Geometry Measurement Technology Development – Demonstration in Revenue Freight Service
  *Cameron Stuart (Federal Railroad Administration)*

Track Gage Restraint Testing: Identifying Compromised Lateral Strength Under Load
  *Andrea Berry-Morris (Holland LP)*

Absolute Track Geometry, what is it and how does it help me?
  *Morgan Reed (Fugro)*

**ANALYTICS**

Future Inspection with Artificial Intelligence and Augmented Reality
Future Track Inspection Utilizing Artificial Intelligence  
*Gary Carr (Federal Railroad Administration)*

Dawn of Augmented Reality in Track Maintenance  
*Robert Grant (NxGen Rail Services)*

New Augmented Reality for Change Detection of Railroad Infrastructure  
*Fernando Moreau (University New Mexico)*

Artificial-Intelligence-Aided Railway Risk Analysis  
*Xiang Liu (Rutgers University)*

**Data-Driven Inspections: Collection and Management**

Corridor Information Modeling  
*Charlotte Muller (Bartlett & West)*

Alstom Healthhub: Power of Digitization Synthesized in a Tailored Interface for Railway Operations  
*Nicolas Flix (Alstom)*

The Utilization of Emerging Technologies for Track Maintenance Planning on the Canadian National.  
*Jon Gascoyne (Zetica)*

Proactive Improvement of Conditions for Safe Rail Operations  
*David Mangold (U of Akron)*

**Data-Driven Inspections: Emerging Analytical Techniques**

Multimodal Data Fusion in Transportation Problems  
*Tim Havens (Michigan Tech University)*

Application of Image Digitization for Train Motion Monitoring  
*Chia-Ming Chang (National Taiwan University)*

Optimization of Ultrasonic Rail-Defect Inspection for Improving Railway Transportation Safety and Efficiency  
*Alexander Lovett (University of Illinois at Urbana-Champaign)*

Machine Learning Approach for Predicting Arrival Times of Freight Traffic to Forecast Track Time  
*William Barbour (University of Illinois at Urbana-Champaign)*
**Preliminary List of Topics**

**Rolling Stock**

**Wayside Systems: Running gear**

Sensor Fusion of Wayside Visible and Thermal Imagery for Railcar Wheel and Bearing Damage Detection  
*Timothy Havens (Michigan Tech University)*

Ultrasound Detection of Defective Railcar Wheels  
*Eugene Matzan (Matzan Reliability Solutions)*

Accelerating Machine Vision Inspection of Truck Components  
*Matthew Witte (TTCI)*

Using Coefficient of Friction to Identify Contaminated Railroad Wheels  
*Pasi Lautala (Michigan Tech University)*

**Wayside Systems: Vehicle Structures and Components**

Plans for Automated Brake Testing of Freight Trains  
*Hans Boysen (Royal Institute of Technology)*

Train Inspection Systems at Union Pacific Railroad: Overview, Benefits and Future  
*Tom Bartlett (Union Pacific Railroad)*
Champaign-Urbana is about 140 miles from Chicago, 190 miles from St. Louis, and 110 miles from Indianapolis. Served by American Airlines, the Champaign (CMI) airport offers 7 daily flights in and out. Alternative airports include: Chicago, IL, St. Louis, MO, Bloomington, IL, and Indianapolis, IN. Champaign is also served by 3 daily Amtrak trains and 1 shuttle (Illini Shuttle) to-and-from the surrounding airports. For additional travel information visit:

**Willard (Champaign-Urbana) Airport:** [www.flycmi.com](http://www.flycmi.com)
**Champaign-Urbana Mass Transit:** [www.cumtd.com](http://www.cumtd.com)
**Amtrak:** [www.amtrak.com](http://www.amtrak.com) 1-800-872-7245
**Illini Shuttle:** [www.illinishuttle.com](http://www.illinishuttle.com) (shuttle to/from Chicago and Champaign) Advance reservation required.

**Illinois Terminal** is located downtown Champaign and serves **Amtrak, Greyhound, Trailways,** and **Megabus.**
Address: 45 East University Avenue, Champaign, IL 61820

**Conference Location:**
Yeh Center, 205 N. Mathews Avenue, Urbana, IL 61801

**Hampton Inn** - 1 block from conference site
Address: 1200 West University Avenue, Urbana, IL 61801
Phone: 1.217.337.1100

**Towne Place Suites** - 5 Blocks from conference site
Address: 603 S 6th Street, Champaign, IL 61820
Phone: 1.217.344.1600

**Hyatt Place** - 1.5 miles from conference site
Address: 217 N Neil Street, Champaign, IL 61820
Phone: 1.217.531.2800