2018

Rail Transportation Program Annual Report Sept 2017- August 2018

Rail Transportation Program, Michigan Tech Transporation Insititute

Rail Transportation Program

Michigan Tech Transportation Institute • Michigan Technological University

Annual Report

Sept 2017 - August 2018

Michigan Technological University
1885
Michigan Tech Transportation Institute

Rail Transportation Program Vision:

"Develop leaders and technologies for 21st century rail transportation."

Mission:

"To participate in the development of rail transportation and related engineering skills for the 21st century through an interdisciplinary and collaborative program that aligns Michigan Tech faculty and students with the demands of the industry."

Director's Message

The Rail Transportation Program (RTP) at Michigan Tech is continuing its work on attracting and educating the next generation of rail transportation and engineering professionals to the industry. The decade of operations has allowed RTP to establish a solid flow of Michigan Tech talent to the industry through internships and full time graduates. We have also created legacy events, such as our annual Railroad Night, Rail and Intermodal Transportation Summer Youth Program, and the Michigan Rail Conference that are today well known to stakeholders within and outside the industry. It has certainly been a decade full of hard work, but it has also been "a fun ride down the track."

Despite the importance of having long-term success with our legacy and other activities, every year also brings some "firsts" with them. This year, we were excited to graduate our first student involved in the Fulbright Scholars Program, as Mr. Alawudin Salim returned to Afghanistan with his MS degree in Civil Engineering. We also had Aaron Dean become the first undergraduate student to receive a second Summer Undergraduate Research Fellowship (SURF) for his work in grade crossing safety. On the research side, we were able to start a highly collaborative project to support our local forest products industry through a unique funding structure by several State of Michigan agencies. You can read more of each of these achievements in the report.

Although it is always fun to reminisce on achievements, we recognize that the only thing we can impact is the future. We recognize the challenges the program is facing, such as competition for talent from a myriad of other industries, and the ups and downs of economy that impact rail business. We are also excited to see how the current and upcoming technologies can help the rail industry in its continuing drive to a safer, more productive future. Over the past year, RTP has been working more closely with technical experts within and outside the University to harness their talent toward such technology development. This is an exciting frontier for us to explore and we hope to report some of the first results in our next year's report.

I think it is time for me to end this message and let you enjoy the report, but I would be remiss if I did it without recognizing some of the entities that truly make our program possible. First, I need to recognize the extensive and sustained support we have received from our key industry partner, CN Railway. It is their belief in the value of our program that allows us to continue to fulfil the program mission and support our students, staff and activities year after year. Second, I need to recognize our Rail Transportation Advisory Board (RTAB) members who volunteer to take their time and expertise toward improving the program. Every good program needs solid support and we are certainly having our share. Thank you for your support!

~Pasi

Rail Transportation Advisory Board

The Rail Transportation Advisory Board continues to fill a vital role, providing guidance and a sounding board for developments in the Tech Rail Transportation Program (RTAB). RTAB is completing the first five years of its service in 2019. RTAB members for this reporting period and their company affiliations are presented below. This year, we added two new members! Bob Pokorski recently retired from Trinity Rail, after a long and illustrious career in the rail car industry. He moved to the Freda area near Houghton (go figure, who moves north for retirement?). When we found he was in the area we snapped him up to fill one of our vacant positions. As the only truly local member of the RTAB he provides a great resource for talking with students and lending a hand when needed. Thanks Bob! We also added another successful Michigan Tech alumni to the Board, Niiko Rautiola (BSME, 08), Director, Global Aftermarket Sales, Progress Rail and a past participant of the Summer in Finland program joined the Board. Welcome Niiko. The RTP wants to thank all the Board members for their indispensable guidance in the continuing development of the Program.

Martita Mullen
Chair
System Manager, Track Standards, CN

Tim Hoeffner (CE, '80)
Vice-Chair
Director, Office of Rail, MDOT

Brent Marsh (CE, '09)
Secretary/Treasurer
Watco Companies

Pasi Lautala
(CE, '97 & '07)
Associate Prof., Director, Rail Trans. Program, MTU

Tim McKay (CE, '84)
Executive VP of Growth & Regional Development, DART

Matt Glynn (CE, '81)
Chief Engineer, Signals & Communications, CN

Bob Pokorski
Retired
Trinity Rail

Jon Cool
President, Michigan Railroads Association

Beau Ihnken (ME, '11)
Shop Supervisor, Loram Maintenance of Way

Daniel Rust
Asst. Professor, Trans. & Logistics Management
UW Superior

David Thomson (CE, '83)
Senior Vice President, Hanson, Inc.

Rob Bingham (BA, '06)
Marketing Manager, Midwest Region, Genesee and Wyo ming, Inc.

Niiko Rautiola (ME, '08)
Manager, Int'l Aftermarket Sales, Progress Rail

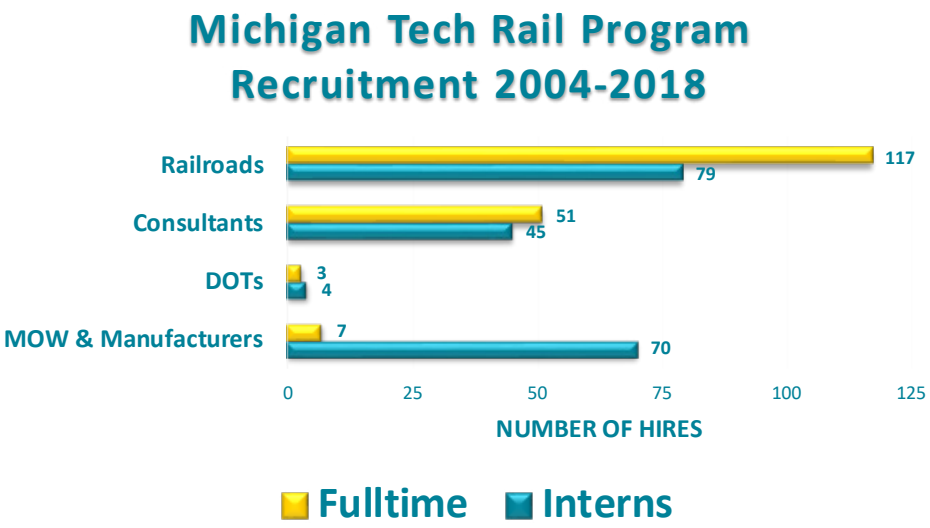
Alex Christmas
REAC President, MTU

Rail Industry Partners and Supporters

In its role as Program Partner, CN Railroad continues to be a core enabler for the Rail Transportation Program. 2017-2018 saw an increase in our internship/full time recruitment coordination and we continued discussions to expand collaborative research efforts as well.

Besides CN, we want to thank again all other companies who take their time and bring their expertise to campus, either as part of Rail Day / Expo or as one of the numerous guest speakers that visit us annually. Without their commitment, it would be hard to demonstrate to our students what success in the industry looks like.

Thank you for your generous support in 2017-2018!



2017-2018 continued our solid trend in internship and full time hires by the rail industry. Interns and full time hires combined, Michigan Tech has introduced over 200 students to rail industry jobs over the past decade…with many of them continuing along their career paths today.

In Memorium - Kevin Kesler

The Rail Transportation Advisory Board continues to fill a vital role, providing guidance and a sounding board for developments in the Tech Rail Transportation Program. This year saw us lose two members. Sadly, one of our charter members, Kevin Kesler from the FRA passed away. His guidance and enthusiasm will be sorely missed. We'll all remember him sounding the train horn at the Rail Day activities in 2015. Another of our charter members, Brian Sykes from NS retired this year, and is stepping away from some of his former duties. He will also be missed, as he was a consistent participant in all things RTAB, and provided a keen insight from the Class 1 perspective.

RTP Faculty & Staff

Dr. Bill Sproule Retires


Dr. Bill Sproule, P.E.

In 2017-2018, one of RTP visionaries and the main individual behind the early development of the Program decided to move to his well-deserved retirement. Dr. Bill Sproule was a Professor in the Department of Civil and Environmental Engineering with over 40 years of service in government, consulting, and university research and teaching in Canada and the U.S. He assisted in the development of the RTP, taught courses in transportation planning, traffic engineering, airport planning and design, public transit, automated people movers, and consulting engineering. Although Bill is retired, we expect to see him regularly in the office to work on his two passions; ice hockey history and culture and the history of North American streetcars. RTP wants to thank Bill for his vision, support and unconditional willingness to always help out with the Program. We'll be back in his office for advice…..even in retirement.


Dr. Pasi Lautala, P.E.

Dr. Lautala is the Director of the RTP and an Associate Professor in the Civil and Environmental Engineering Department. For past ten years, Dr. Lautala has been one of the leaders in re-establishing rail transportation education and related research in North American universities. He's an Associate Director of Education for the NURail Consortium, one of the seven members of the State of Michigan Commission for Logistics and Supply Chain Collaboration and Chair of TRB ARO40 Freight Rail Transportation Committee. Since the fall of 2016, Dr. Lautala has also served as the Director of Michigan Tech Transportation Institute. Before his academic career, Dr. Lautala spent several years in the rail industry in the United States and Finland.


Chris DelReal

Chris DelReal is a 2010 graduate of Michigan Technological University's Computer Networking and System Administration Program. He now works with Michigan Tech's Center for Technology & Training as a web designer, technical advisor and code developer. Chris supports RTP's web services and developed the Rail Learning System to offer online railway engineering education resources.


Pam Hannon

Pam Hannon is the Coordinator of the Michigan Tech Transportation Institute and supports the Rail Transportation Program through proposal development and coordination, and research project management.


Amanda Kerttu

Amanda Kerttu has been working with RTP on a part-time basis since 2015. Her main responsibilities have included the logistics coordination and management for the Michigan/Midwest Rail Conference and development of RTP publications and promotional materials.


Dave Nelson, P.E.

David Nelson is our Senior Research Engineer and supports activities across the program. Dave has a BS in Civil Engineering and an MS in Mechanical Engineering which will help as we continue to push for multidisciplinary collaboration across the university. He also has an MS in teaching, including seven years of experience in primary and secondary schools. Dave's 20+ years of engineering and management experience with the US Air Force, including a tour teaching at the US Air Force Academy, and his experience from the rail related projects with Maine Department of Transportation bring a unique set of skills and experiences to our program. Dave is actively involved in TRB's Highway-Rail Crossing Committee and AREMA's Committee 24, Education and Training.


Kuilin Zhang

Kuilin Zhang is an Assistant Professor in the Dept. of Civil and Environmental Engineering at Michigan Tech. Dr. Zhang received his Ph.D. degree in Transportation Systems Analysis and Planning from the Department of Civil and Environmental Engineering at Northwestern University in December 2009 and came to Michigan Tech after working as a Postdoctoral Fellow in the Transportation Center at Northwestern and the Energy Systems Division at Argonne National Laboratory. He is a member of Transportation Research Board (TRB) standing committees of Transportation Network Modeling (ADB30) and Freight Transportation Planning and Logistics (AT015). He directs a high-performance computing Laboratory on Sustainable and Intelligent Transportations (SITS-Lab), and teaches transportation planning and transportation systems analysis.

Student Intern/Co-op Highlights

RTP helped to place several students into rail industry internships in 2018. Summaries of some of their experiences are below.

Michelle Hart (CN)

For the summer of 2018, I worked for Canadian National Railway (CN) as a track intern for their Michigan Zone. I worked at their headquarters in Homewood IL, out in the field, and in satellite offices working on a project related to the industries CN services. My project saved CN money by determining what part of industry sidings (tracks) CN owns and maintains and what part the industry owns and maintains, which involved looking through a lot of contracts. My main supervisor was very enthusiastic about getting things done and solving problems; he was great to work with. I met many great people at CN and got to see the challenges the rail industry has but also how incredibly important the rail industry is to the US economy.

Alex Christmas (Union Pacific)

For the summer of 2018, I was honored to be selected by Union Pacific to partake in their summer engineering internship program. As one of the premier Class One railroads, UP offered me a chance to get my hands dirty - literally - in railroad operations and maintenance. Stationed throughout Utah, Idaho and Montana, I worked alongside various maintenance-of-way crews. Work included changing rail and ties, inspecting track for geometric defects and sun kinks, as well as surface and lining on a continuous action tamper. To say I absorbed a lot of information and field-proven wisdom would be an understatement! I look forward to returning to UP in the Summer of 2019, to continue building upon this incredible experience!

Walter Friesel (RJ Corman)

This past summer, I held an internship with RJ Corman Railroad Group (Railroad Division) on its Central Kentucky Line in Lexington, KY. I worked with a group of highly skilled professionals who all became good friends of mine. I learned a great deal about EMD locomotives as I performed 92-day and 1-year inspections on them as required by the FRA. I was also blessed with the opportunity to perform inspections on new Railpower Genset locomotives and witness the complexity of the computer system used to operate these locomotives. I enjoyed my time there and will likely return next summer to continue my learning.

Alumni Highlights

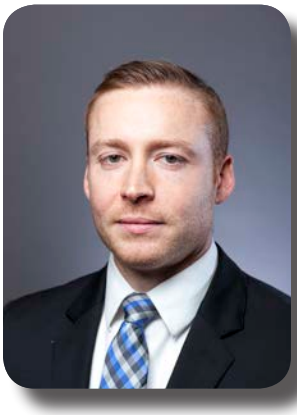
Derek Harter (BS, CE, 2008, MS, CE, 2009)

Assistant Chief Engineer, Canadian Pacific

Derek graduated from Michigan Tech with a Bachelor's Degree in Civil Engineering in 2008 and a Master's Degree in Civil Engineering with a focus in Transportation in 2009. He was hired by CN in the summer of 2009 and joined Canadian Pacific (CP) in November 2011. He is currently the Assistant Chief Engineer for CP out of Toronto, Canada.

Derek did several internships between 2004 and 2008 in the consulting/surveying/utilities industry along with two years at MDOT working on the I-75 rebuild. He didn't find the rail industry until 2009 during the spring career fair at Michigan Tech and was sold on the idea by CN. He did management training at CN and worked as a management trainee and Project Engineer Assistant Track at CN. In 2011, CP offered him an entry level position with prospects of moving up to Division Engineer and learned the position from Harrison. In December 2013 he became an Assistant Chief Engineer Track, in August 2015 he became a Regional Track Engineer, in October 2016 during a reorganization, he became an Assistant Chief out of Chicago and in April 2017 he moved to Toronto where he holds his current position. In 2017, Derek was selected as one of the Rising Stars in the industry by The Railway Age.

As the Assistant Chief Engineer, he ensures that the physical plan is maintained. In the Eastern Canada/Eastern US, he oversees the production of rail and tie, implements plans for bridges, culverts, signals and communications. He never has a dull day! His job is ten percent engineering and ninety percent management. Some plans start on the back of a napkin then are quickly put into place. He stated that Michigan Tech gave him the background needed to succeed!



Charles Hoppesch (BS, CE, 2008)

Principal Engineer and Rail Operations Manager, Quandel Associates

Charles Hoppesch is a Principal Engineer and Rail Operations Manager for Quandel Associates. He previously worked for AECOM for nine months as a Project Engineer and Parsons Brinkerhoff (WSP) in the light rail as a Signal Engineer before coming to Quandel in August of 2012.

He chose the rail industry as it was a good business to get into, the rail was hiring and he had a good opportunity. He got into his position by completing two internships with consulting/big projects and worked his way to where he is. He has been in his current position for two years where he takes stock of project statuses and delegates projects to engineers. Every day is a little different. He said that the times when convinced by the company to visit the field were informative and RTP was great for making connections with the rail industy.

Recent Graduate Highlights

After awarding the first Minor in Rail Transportation to Otto Freiburg in 2017-18 we've seen four more students graduate with the minor. Derek Owen, one of those grads, is highlighted below. We currently have several more students in the pipeline, with a new batch of underclassmen ready to make that selection in the near future. We typically touch about 60 students per year with one of our courses or through REAC.

Haylee Lakenen (BSCE, 2018)

Supervisor Engineering Support, BNSF Railway

After graduating with my BS in Civil Engineering, I entered the BNSF Railway Management Trainee program in the Engineering – Track Department. I started in Kansas City, KS where I spent time with multiple departments learning how they work together to move freight and take care of the rail infrastructure that enables train movements.

After 1.5 months, I received an early promotion to the Supervisor of Engineering Support in Flagstaff, AZ. This was quite an opportunity at such early point of my training that I could not turn my back to. My responsibilities consist of performing administrative duties such as ordering materials, paying invoices, creating reports, moving equipment and much more. I also cover for multiple Roadmasters where I lead track maintenance on their territories. I coordinate different projects including, turnout installs, road grade crossing rehabilitation, track panel replacement, and the reconstruction of a bridge.

I have learned a lot and gained a great deal of valuable experience in a short period of time. I look forward to seeing what the rest of my career brings.

Derek Owen (BSCE with minor in Rail Transportation, 2018)

Assistant Civil Engineer, WSP

Upon graduating last May, I moved to Seattle to take a civil engineering position with WSP USA. I had the fortune to work with the firm on light rail transit projects over the course of two summers, exposing me to new and exciting transportation alternatives. This involvement is what ultimately encouraged me to seek out career opportunities in a region that largely supports investments in transit. Since joining the team full-time, I have been involved in numerous rail-related efforts, including a freight rail expansion proposal, two passenger rail design projects and most recently, a PTC field validation role for a Class I railroad. My PTC validation role allows me to travel across the Midwest via hy-rail, verifying that on-board locomotive computers are recognizing and communicating with signals and other trackside assets. Since attending my first REAC meeting, I knew that I wanted to be involved in the rail industry at some capacity. I am pretty fortunate to have ended up where I am today, doing what I love."

RTP Students

2017-2018 Graduates

There was one RTP graduate for the 2017-2018 year. Congratulations and thank you to Alawudin!

Alawudin Salim

MSCE, CEE

Evaluation of Driver Behavior at Highway-Railroad Grade Crossings Based on Environmental Conditions and Driver Demographics

Alawudin was the first student to work with the RTP as a Fulbright Scholar. He is a native of Afghanistan and returned home with his MSCE from the Civil Department.

His research at Tech concentrated on our crossing safety analysis, highlighted on Page 11.

Continuing Graduate & Undergrad Students

Steven Landry (Continuing Grad Student)

PhD Candidate, Applied Cognitive Science and Human Factors
Advisor: Dr. Myounghoon (Philart) Jeon

In addition to his PhD dissertation topic, "Interactive sonification strategies for the motion and emotion of dance performances" Steve continued to work with RTP on our research of driver behavior at grade crossings. He supervised the ongoing simulator work required for FRA contract, and helped write papers for the AREMA conference and TRB.

Aaron Dean (Undergrad Researcher)

Aaron Dean is a senior in the Mechanical Engineering - Engineering Mechanics Department and the President of the Railroad Engineering and Activities Club (REAC). Aaron has been working with RTP since his freshman year. For the past year he has concentrated on developing methods for analysis of the NAturalistic Driving Study data at grade crossings. For the summer 2017, Aaron worked as a summer intern for Pettbone.

Sangpil Ko (Continuing Grad Student)

PhD Candidate, Civil Engineering
Advisor: Dr. Pasi Lautala

Sangpil received his B.Sc. and MS degrees in Seoul, South Korea majoring in Transportation and Logistics. He worked for Korea Railroad Corporation (KORAIL) after graduation. The experience with this rail company led him to study more about transportation and railroad research. Sangpil is currently working with the PIRE Biomass project, funded by NSF. The title of this project is "OISE-PIRE: Sustainability, Ecosystem Services, and Bioenergy Development across the Americas". Most recently, Sangpil has concentrated on evaluating supply chain alternatives for biomass co-firing at existing coal power plants.

Kyle Dick (Undergrad Researcher)

Kyle Dick is a second year student in the Computer Sciences program. He has been an integral part of our ongoing SHRP2 Naturalistic Driving Study research program and a study on log movements in the Upper Peninsula and northern Wisconsin, providing analysis and data input. He also served as the REAC treasurer, and helped automate the financial record keeping for the RTP.

Alex Christmas (Undergrad Student)

Alex Christmas is the current president of the Railroad Engineering and Activities Club and a third year student in the Civil and Environmental Engineering program. He has been working with RTP since his sophomore year. His primary focus is assisting with internal reports, and updates to our web page and outreach documents. He has worked as a summer intern for both Quandel Consultants and Union Pacific.

Graduate Student Research Highlights

Sangpil Ko

WOODY BIOMASS LOGISTICS FOR CO-FIRING AT EXISTING COAL POWER PLANTS – CASE STUDY OF THE GREAT STATE LAKES

Bioenergy has received increasing attention as potential replacement for fossil fuels, but the share of the US energy generated by biomass has remained stagnant, as the implementation of bioenergy can increase only if it can be justified from economic, environmental and social perspective. One of the critical aspects required for increase is cost-effective transportation. The work by Sangpil Ko concentrates on investigation of multimodal alternatives for woody biomass transportation and logistics. More specifically, two analytical models were developed to determine optimal co-firing ratio and to integrate the advanced logistics system as an alternative for woody biomass supply chain. The models were tested with case studies of 26 actual coal power plants in the Great Lakes States.

The studies revealed that 1) multimodal transportation is essential when establishing larger biomass plants or increasing the scale of co-firing. We Found the larger plants help to reduce the transportation and logistics costs, and as such support the increase in the use of biomass. 2) Local conditions have great impact on biomass transportation logistics, as the performance of woody biomass logistics system highly depends on the accessibility of local transportation networks, such as loading/unloading sites along rail lines. 3) When investigating logistics cost differences, plant capacity, biomass availability nearby, and average distance from biomass collecting sites are parameters with consistently high impact on the preferred solution, although the impact of each parameter may vary for a specific model or case study. 4) There would be potential benefits from woody biomass in the Great Lakes States, but inclusion of transportation and logistics system analysis that considers various types of supply networks and torrefaction processes is essential to select the most suitable system.

The co-firing modeling studies were published in the Transportation Research Record (TRR) by the National Academies of Sciences, and in the Agriculture Journal. The complete dissertation will be finalized by the end of 2018.

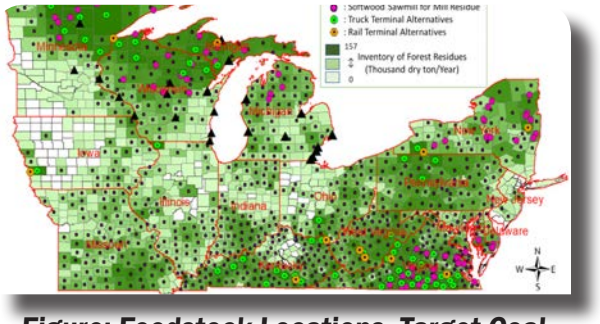


Figure: Feedstock Locations, Target Coal Power Plants, and Potential Terminals.

Alawudin Salim

EVALUATION OF DRIVER BEHAVIOR AT HIGHWAY-RAILROAD GRADE CROSSINGS BASED ON ENVIRONMENTAL CONDITIONS AND DRIVER DEMOGRAPHICS

This study continued the research at Michigan Tech on using the Strategic Highway Research Program 2 Naturalistic Driving Study (SHRP 2 NDS) data and a scoring methodology developed at Michigan Tech to evaluate driver behavior when traversing highway-railroad grade crossings (HRGC). This research used a two-sample t-test to determine whether there is a statistically significant difference in driver behavior based on weather condition, driver demographics (gender and age) and time of day. It also further divided the HRGCs to three subgroups based on the traffic control devices (TCD) and performed similar analysis for each subgroup.

The research only found statistically significant differences between a small number of the compared categories. More specifically, both male and female drivers received lower behavior scores during the night compared to the day. In contrast to the findings of some past studies, the data did not show any significant difference in average behavior scores of male versus female drivers. Except for snow, the research revealed very little difference in behavior for any tested weather conditions.

The research has been presented in the 2018 Joint Rail Conference and a paper has been accepted to the 2019 TRB Annual Meeting.

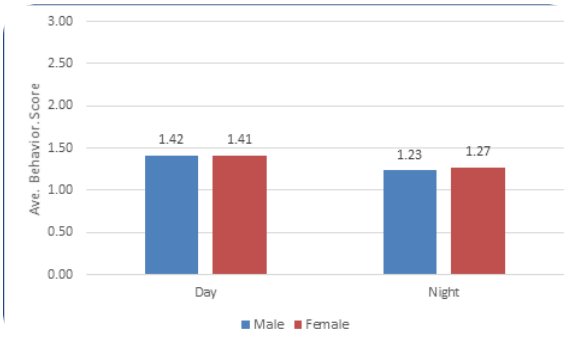


Figure: Average Behavior Score based on Time of Day and Driver Gender.

Student Activities

Railroad Engineering & Activities Club (REAC)

The 2017-2018 school year for the Railroad Engineering and Activities Club marked another successful year for the AREMA Student Chapter, advancing our mission to connect students to the railroad industry. As the Charter AREMA Student Chapter, REAC has long prided itself on active outreach to students and the community, often partaking in such events as K-Day, while hosting events such as Transportation Careers Night and joining RTP to host Railroad Night.

Our primary events throughout the year are our monthly speaker series meetings, known as General Business Meetings. Each month we have an expert from the industry come in to share their expertise and experiences within the industry. These allow perspective students to see what might be of interest to them, and network with industry professionals.

This year six presenters (four of them Michigan Tech alumni) included Rob Pokorski (retired TTX), Derek Harter (Canadian Pacific), Sean Pengelly (Lake State Ry), Christian Riedel (Pettibone), Phil Pasterak (WSP), and Niiko Rautiola (Progress Rail). Thank you to all of our industry speakers!

Another anchor event each year is our trip to the AREMA national conference, held in September of 2017 at Indianapolis as part of Railway Interchange. Twelve students made the trek, stopping also in Joliet, IL to tour BNSF Logistics Park Chicago. The conference provides students with professional development and networking opportunities, which were certainly taken advantage of, with several students ultimately securing summer positions from the experience.

For our annual Fall Field Trip, we traveled to Escanaba where we toured the Escanaba and Lake Superior's railcar repair and refurbishment facility, along with CN's Gladstone Yard. This provided a great insight into rolling stock and day-to-day operations for the group.

In April, our annual spring trip took us to the SE Michigan region, with tours of Anderson's Grain in Toledo, the Ford Rouge Complex and Henry Ford along with the M-1 "Q-Line" Lite Rail carbarn and streetcar facilities.

On the community outreach front, multiple REAC members participated in the annual Santa Train event at the Lake Linden and Torch Lake Railroad Museum. We helped operate the family event bringing smiles to dozens of local children and their parents.

All and all it was a solid year for REAC. I would like to thank all of our supporters in the industry - particularly those who made the trek up to campus to speak and partake in recruiting events. We students value getting to meet and chat with industry professionals whom we aspire to join in the field after graduation. Much of what we do would simply not be possible without your support.

Alex Christmas, REAC President

REAC Spring

REAC Fall

13th Annual Rail Night & 4th Annual Rail Day Expo | October 3-4, 2017

Keynote Speaker: Kevin Riddett President & CEO - RAILWORKS

The Rail Transportation Program (RTP), with the Railroad Engineering and Activities Club (REAC) and with support from the RTP Program Partner, CN Railway, were proud to host Michigan Tech's 4th Annual Rail Expo and 13th Annual Rail Night on October 3rd and 4th.

Dual showcase events, Railroad Night and Expo, bring together industry professionals and students interested in the industry. The unique blend of panel discussion, social hours, dinner, keynote and displays on the campus mall catalyzed relationships between the students of Michigan Tech and the Railroad Industry. These marquee events are a cornerstone of our mission to develop leaders and technology for the 21st century in railroad transportation.

Railroad Night XIII was held on the evening of Oct. 3, kicking off our showcase events where railroad industry professionals and Michigan Tech students mingled and discovered the possibilities of a career in the railroad industry. Starting out with a "Meet the Industry" panel of 10 industry professionals, a battery of questions from both the moderator and audience allowed students to discover the railroad industry, take advice and hear some interesting stories out of the industry.

Afterwards, students and professionals mingled for the social hour, which was a great opportunity for students and the industry to get to know each other further, with discussions about internships, full-time positions or points about the industry in general. This more relaxed atmosphere is always conducive to productive discussions in an industry-focused environment, a perennial favorite of Michigan Tech Students. Following the social hour was dinner and the keynote address by Kevin Riddett, the CEO of Railworks. Speaking of his career and experiences in multiple roles throughout various industries, Riddett imparted sage advice and plenty of stories to the audience over a dinner filled with more interaction between the industry and Michigan Tech students interested in a career in rail. Special thanks to Railworks and Herzog Railroad Services, for sponsoring the Railroad Night XIII.

The Rail Expo was held on the Campus Mall, allowing the industry to demonstrate industry technologies, and to recruit Michigan Tech students. Pettibone's Speed Swing, the Semi Truck from Schnieder, and the ORV equipped with high tech survey equipment from Survey Solutions anchored the outdoor displays. A demonstration of hand-tools used on the railroad by Lake Superior and Ishpeming Railroad rounded out the outside displays. Under the tent CN, WSP, Quandel Consultants, Railworks, Remprex Engineering Services, Bergmann Associates, Via Rail Engineering, and Kiewitt's Mass Electric Construction Company used computer displays and discussion from their personnel to inform students about the many opportunities available in the industry, and to recruit students to full-time and intern positions. BNSF Railway added a signal demonstration to the mix under the tent.

For students, the event offered a great chance to discuss opportunities in the industry with representatives and recruiters, with more than a dozen companies on display and twice as many industry professionals ready to discuss who they are and what they do. While many Michigan Tech students are already interested in a career in rail, the Expo provides a catalyst for new students to get interested and involved within one of the nation's most diverse and thriving transportation industries.

Every year, Michigan Tech's Rail Night and Expo events culminate in a number of internships and full-time careers. With nearly 200 students passing through the Expo or attending Railroad Night, this year's events continued the success initiated almost a decade ago.

REAC Officers at Rail Night

Students check out a speed swing at the Rail Day Expo

Youth Activity Highlights

8th Annual Rail & Intermodal Transportation Summer Youth Program

July 8-14, 2018

2018's edition featured another great year of explorations for High School Students throughout the Lake Superior Region! Michigan Tech partnered with UW Superior for the 8th annual event, with UW Superior hosting two days of activities in the Duluth/Superior region.
We had great weather all week long, and 16 students took part from across the country. Our field trip list provided excellent experiences, with visits to six different industry locations:

- **LS&I Railroad** – tours of the car and locomotive shops, the maintenance of way equipment, and the Tilden Mine ore pellet load out facility provided a great introduction on Monday afternoon. Our students loved the opportunity to climb up in a locomotive cab!
- **BNSF Superior, WI railyards** – a visit to the dispatch tower provided an overview of the yard, and a visit to the car shop provided detailed information on how cars are maintained. We had a great photo opportunity in front of a locomotive in Sante Fe railroad colors!
- **CN's Duluth Cargo Connect Intermodal Facility** – this visit provided an opportunity to explore the rail/truck/ship interface in detail! Cranes, docks, rail lines, warehousing, and trucks … this facility has it all! The facility opened in 2017 provides a vital connection between sea-born cargo vessels and the Midwest rail system.
- **Halvor Lines Trucking Terminal** – It's impossible to talk about rail transportation without discussing the trucking interface for the "last mile" moves. Halvor is a full service trucking company, providing both long distance, over the road movements and connections to rail. The chance to check out the truck training simulator is a perennial favorite of our students.
- **Lake Superior Railroad Museum and North Shore Scenic Railroad** – This stop provides students a chance to explore the history of railroading. A ride on the North Shore Scenic Railroad is another favorite activity for our students.
- **Lake Linden and Torch Lake Railroad** – Although a much smaller venue than the one in Duluth, this stop provides a great way for students to relax on the last day of the week. They have the opportunity to explore the property and testing their mettle against a rail track switch gives many an opportunity to show off. The site is filled with rail memorabilia from the Copper Country, including an extensive model railroad layout.

Along with the field visits students also got some hands on classroom activities: building a model track section, using a computer based locomotive simulator, constructing mag-lev rail cars, and visiting an active railroad-highway grade crossing all added to the week long experience.

As always, we owe a big thanks to our partners at University of Wisconsin/Superior, and to all the industry companies that make the field trips possible!

Student & Youth Other Events

November - 2017
11 November: 12 Students from REAC attended the fall field trip to tour the Escanaba & Lake Superior car repair facilities in Escanaba, MI, as well as the CN Gladstone Yard.

December - 2017
02 December: 5 Students from REAC assisted the Houghton Co Historical Society during their annual "Santa Train". Activities consisted of helping passengers on and off the train as well as collecting tickets.

February - 2018
27 February: REAC hosted Transportation Night with the local ASCE and ASME chapters.

At Halvor Lines, everybody got to check out one of their big rigs!

At the Lake Linden & Torch Lake Railroad, students attempted to throw the switch to the shop - not an easy task!

2018 SYP Program Sponsors:

IANA CN NURail Center

2018 Youth STEM Festival and Science Fair

April 12, 2018

On April 12th, REAC and RTP supported the annual Michigan Tech STEM Festival and Science Fair. REAC members displayed our track-in-a-box model railroad, and a new railroad signal demonstration constructed by Alex Christmas and Kyle Dick. The big hit with kids and their parents alike was our Griswold Model 52 Mechanical Crossing Bell, which showed how railroads use electro-mechanical engineering to operate safely and efficiently.

Scholarships

Scholarship Winners

Each year the RTP offers internal scholarships funded by industry partners and students compete for AREMA scholarships including Michigan Tech Alum AREMA Scholarships. Here are the 2018 scholarship winners:

AREMA Scholarships

Derek Owen	CE	Michigan Tech Alumni Scholarship
Alex Christmas	CE	Canadian National Railway Company Scholarship
Smruti Dash	EE	Michigan Tech Alumni Scholarship
Alyssa Leach	CE	Michigan Tech Alumni Scholarship

CN Railroad Scholarships

Aaron Dean	ME
Alex Christmas	CE
Clarice Hill	CE

Congratulations to all the winners!

RTP Student Awarded Fellowship

Aaron Dean, MEEM, received a Summer Undergraduate Research Fellowship for the summer of 2018 to continue his research on driver behavior at highway-rail grade crossings. His project titled *" Using Naturalistic Driving Data and Machine Learning to Predict Accident Risk at Highway-Rail Grade Crossing"* concentrated on integrating a machine learning approach into our ongoing quantitative evaluation of driver behavior at crossings. The main goal of this research is to use the observed behavior at crossings to create a model that will improve accident prediction at crossings. The model will include driver behavior characteristics with improved crossing characteristics information with better crossing environment variables. The research conducted may also reveal the physical aspects of the crossing environment that most contribute to an increased risk of accidents.

Aaron Dean

Other Events / Professional Development / Workshops

September - 2017

28 September: Pasi attended a Michigan Commission for Logistics and Supply Chain collaboration meeting in Sault Ste Marie, MI

October - 2017

20 October: Darian Reed went to a construction conference (ASC Sophmore Summit) sponsored by Kiewit

January - 2018

11-12 January: Pasi visited Volpe and FRA to discuss crossing research

26-28 January: Dave traveled to Jacksonville, FL to participate in REES planning and other committee business (AREMA Committee 24 Meeting)

March - 2018

14-15 March: Pasi and Sangpil visited VERSO for timber logistics research

22 March: RTAB Telecon

23 March: Pasi visited CN in Homewood

23 March: Dave judged a research poster session for the Undergrad Research Symposium

April - 2018

03 April: MTTI Research Planning Presentation: Beyond Traffic - Growing Transportation Research at Michigan Tech

May - 2018

09-12 May: Pasi attended the Commission for Logistics and Supply Chain Management to meet with MDOT, MTRI and others.

Research Highlights

Driver Behavior at Highway-Rail Grade Crossings Using NDS and Driving Simulators

The two-year project by the Federal Railroad Administration (FRA) to study driver behavior at highway-rail grade crossings was in its final stages in summer, 2018. The purpose of the study was to harness the SHRP2 Naturalistic Driving Study (NDS) data base in an attempt to quantify the level of defensive driving behavior during HRGC traversals. We developed a three-point scale and automatic data processing application for the analysis and used it to generate driver behavior score for over 9,000 individual traversals at 300+ crossings. We used the mean scores to perform statistical comparisons of driver behavior at HRGCs with different traffic control devices (TCDs) and between HRGCs that have and have not witnessed accidents in the past. We also explored whether trending could be identified among parameters identified as critical to safety in the past studies. Finally, we simulated two HRGCs in a driver simulator and compared the driver behavior scores between naturalistic and simulated environment.

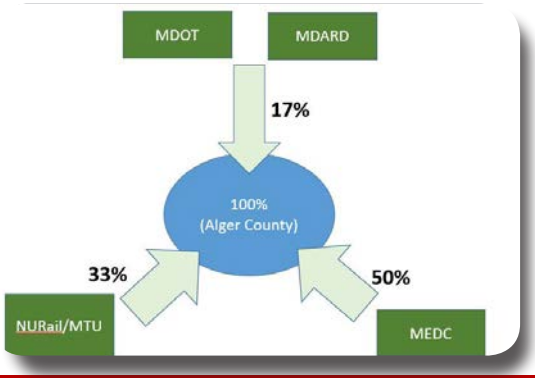
The investigation revealed that most drivers do not visually scan for trains and do not prepare to stop, regardless the type of warning device present at the crossing, or the environmental conditions that prevail at the time of traversal. The results were fairly consistent in both NDS and simulated approaches. The NDS data analysis showed very little statistical difference in driving behavior between any of the TCDs analyzed, with the exception of passive HRGCs equipped with stop signs. The other consistent finding was the higher mean scores for traversals that took place during the day versus night time. We also found interesting trends on AADT, trains per day and train/highway speed impact on driver behavior score.

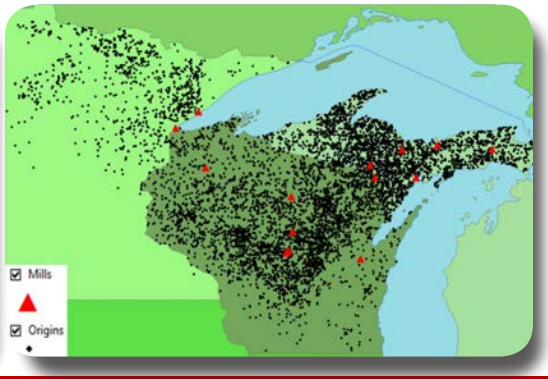
Figure. Driver Simulator (left) vs. the actual view (right) at one of the tested HRGCs

RTP Secures Multi-Agency Funding for Upper Midwest Forest Product Rail Study

In March, 2018, the RTP commenced work on a project under planning for several years. The Log Movement in the Superior Region – Rate and Capacity Based Analysis of Modal Shares project was made available through an innovative funding collaboration that includes the Michigan Economic Development Corporation (MEDC), Michigan Department of Transportation (MDOT), Michigan Department of Agriculture & Rural Development (MDARD), and US Department of Transportation (USDOT) through National University Rail Center (NURail). Alger County in the Upper Peninsula is also involved in managing the project funds.

The project works in collaboration with the Lake States Shipper Association that is composed of most major forest products industry companies in the region. The objective is to conduct detailed modeling analysis of all log movements in the region and investigate potential synergies and opportunities toward increased use of rail transportation in the movements. The project will also investigate the final project movements out of the region as the first step in evaluation for a potential transload facility to encourage rail transportation. The project will be completed in late spring/early summer of 2019.





Student Projects

Student projects are an important part of RTP activities. RTP led two rail related civil/environmental senior design projects during the 2017-18 school year.

Manistique Transportation Improvements

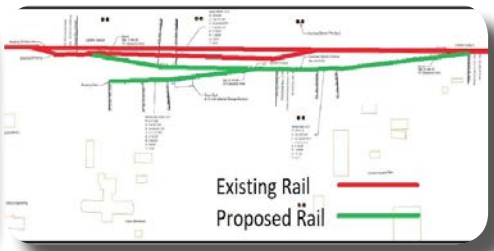
In the fall of 2017 a group of 15 students tackled a slate of transportation improvements for the City of Manistique. These projects were focused on improving access to three industrial areas in the city, and included both rail and highway access. The team worked on conceptual and preliminary design improvements, and were also required to develop and present a rail operations plan detailing switching and storage at each location.

The team worked with UP Paper to address an inefficient and deteriorating rail access to the paper mill. The student proposal would realign the existing track inside the mill property line and add about 2,400 feet of new storage track. The students also proposed a new, safer truck entrance to the mill. A long range proposal included a new CN mainline turnout and a through loop to improve operational efficiency and increase storage for railcars.

The team also worked on a new rail spur from an existing siding to serve an industrial park north of Manistique. The project would provide improved access for existing tenants and a proposed new business. The work includes about 3,000 feet of new track and a cross-dock transloading area. The site work also includes improvements to the roadway access to the site, as well as parking and loading areas for trucks.

In addition, the team worked on access to an existing sawmill site on the west side of the city. The site is adjacent to the CN mainline, but currently has no rail access. The plans for this area call for creation of a mulch production facility. This site would require 1,500 feet of new track, a 2,400 foot long access road, and loading ramps adjacent to the track spur. Approximately 30,000 square feet of covered storage would be provided to protect mulch materials awaiting shipment.

Costs for the proposed projects would be $4.6 million, $2.2 million, and $2.5 million, respectively.



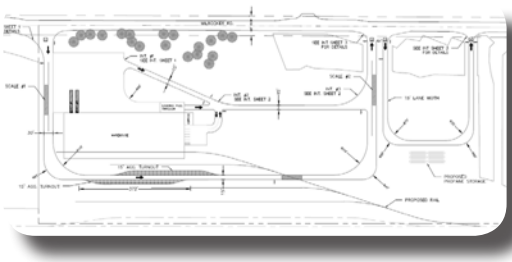
Students study logistics facilities at UP Paper

Lake State Rail Site Development

In the spring of 2018 a group of 15 students tackled a project for Lake State Railway. The company had recently acquired a parcel of land adjacent to a rail siding on their mainline into Gaylord. Working with Sean Pengelly, a former RTP student and alumnus of our Summer Youth Program, three student teams worked on development of the parcel itself, while a fourth team investigated an extension of the LSRC rail line from Gaylord to Vanderbilt.

The students developed a track plan for log and dry bulk transloading operations and a separate spur for propane and liquid fuels transloads. A fourth spur would provide access into a warehouse for coil steel and other weather sensitive materias. The team also developed a plan for the warehouse, including loading and storage operations. The plan also included highway access into the site, as well as circulation and parking within the site. The cost estimate for track improvements was $850,000 with another $900,000 for the highway access and circulation improvements, and $3.5 million for the warehouse and transloading equipment.

The rail line from Gaylord to Vanderbilt would require complete reconstruction of the rail line on existing roadbed. In addition a recreational trail that currently utilizes the track bed would need to be relocated to accommodate the restored track alignment. The new alignment would require 8.5 miles of new track at a cost of about $6.5 million and two new bridge structures at a cost of $1.1 million. The trail relocation would run another $1.2 million.



LSRC Site Development

RTP Students in Gaylord

Conference Highlights

AREMA 2017

September 17-20, 2017

Team 1 at AREMA

Dr. Pasi Lautala and eleven Michigan Tech students participated in the Railway Interchange in Indianapolis. As part of the student activities, Team 1 of the Railroad Engineering and Activities Club (REAC), consisting of Aaron Dean (ME), Alyssa Leach (CE), Alex Christmas (CE), Derek Owen (CE) and Mario Marachini (CE) got 3rd place in the student quiz bowl. Team 2 (Kyle Dick, Andrew Erickson, Erick Flaten, Clive Pinto, Pratik Tuplondhetook) 7th place in the bowl. Aaron Dean took 1st place in the Undergraduate Division with his poster on "*Using In-Vehicle Head Orientation Sensing Data to Rapidly Evaluate Driver Visual Scanning Behavior at Rail Grade Crossings*". Dean also presented a poster "The Evaluation of Driver Compliance Behavior at Grade Crossings based on Naturalistic Driving Study Data" by Modeste Muhire in his absence as part of the graduate poster competition, taking 2nd place. As part of the conference, five Michigan Tech students were also recognized for winning student scholarships by the American Railway Engineering and Maintenance of Way Association (AREMA). To cap a successful conference, Dr. Pasi Lautala presented "Evaluation of Driver Behavior at Highway Rail Grade Crossings" in the closing general session of the conference.

10th SHRP 2 Safety Data Symposium

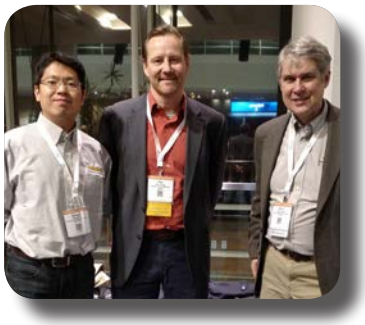
October 6, 2017

Aaron & Pasi at SHRP 2

Dr. Pasi Lautala and Aaron Dean participated in the Tenth SHRP 2 Safety Data Symposium; From Analysis to Results in Washington, DC. The Symposium included nineteen selected presentations by the researchers within and outside the US that use the SHRP 2 Naturalistic Driving Study database. Aaron Dean presented his research on "Development & Validation of Post-Processing Methods for the SHRP2 MASK Head Pose Data" and Lautala presented on "Using NDS data to evaluate driver behavior at highway-rail grade crossings". Michigan Tech was the only institution invited to make two presentations in the conference and Dean was the only undergraduate presenter.

97th Annual Meeting of the Transportation Research Board

January 2018



Sangpil, Pasi & Dave at TRB

Dr. Pasi Lautala, David Nelson and Sangpil Ko participated in the 97 Annual Meeting of TRB. Dr. Lautala chaired the committee meeting of AR040 Freight Rail Transportation and participated in the meetings of Rail and Freight Executive Groups. Nelson participated in the meeting of ABH60 Standing Committee on Highway Rail Grade Crossings as a committee member. Sangpil Ko presented his paper "Advanced Woody Biomass Logistics for Co-Firing in Existing Coal Power Plant: Case Study of the Great Lakes States" that was also selected to be published in the Transportation Research Record. Nelson and Lautala presented their paper "The Assessment of Driver Compliance at Highway-Railroad Grade Crossings Based on Naturalistic Driving Study Data".

Joint Rail Conference

April 2018

Alawudin at JRC

Alawudin Salim was the sole representative of RTP at the Joint Rail Conference in Pittsburgh, PA. Mr. Salim presented paper based on his MS research project "Using Naturalistic Driving Study Data to Investigate Driver Behavior at Highway-Rail Grade Crossings".

Railway Engineering Education Symposium

June 25-26, 2018

The 2018 edition of the Railway Engineering Education Symposium was held in Columbia, SC on the University of South Carolina campus. REES is held on a biennial basis, and is sponsored by AREMA Committee 24, and supported by a variety of industry sponsors. Dave helped plan and execute the event, developed this year as a user's conference with 13 returning professors, and 9 new attendees. The program consisted of an Industry Panel presentation and discussion, followed by an Academic Panel and discussion. Panel members and their affiliations are listed below. The Industry panel focused what the industry needs to see in students graduating into industry jobs. The Academic panel responded with what the academic community is doing to try to meet those needs. The discussion forums following each forum centered on pulling these two strings together. Pasi was a member of the Academic Panel, one of his last official functions before leaving for Finland on his sabbatical.

Industry Panel	Affiliation	Academic Panel	Affiliation
Don Graab	VP – Mechanical (Retired) Norfolk Southern Corporation	David Clarke	Director of the University of Tennessee Center for Transportation Research
Jim Kessler	VP – Engineering North Carolina Railroad Company	Tyler Dick	Senior Research Engineer with RailTEC at the University of Illinois at Urbana-Champaign
Adam Lewis	Supervising Signal Engineer, WSP	Pasi Lautala	Director of the Rail Transportation Program (RTP) and the Michigan Tech Transportation Institute
Niiko Rautiola	Director of Global Aftermarket Sales at Progress Rail	Leslie Myers McCarthy	Associate Professor of Civil & Enviro Engineering, Villanova University
Brian Sykes	Chief Engineer, C&S Engineering (retired) Norfolk Southern Corp.	Dimitris Rizos	Director of the Railway Engineering Program, and the Railway Infrastructure Laboratory at the University of South Carolina

Guest Speakers / Visitors

October - 2017

10 October: Rob Pokorski, recently retired from Trinity Rail, *Rolling Stock management and Maintenance*

November - 2017

07 November: Derek Harter from CP, *Capital Investment Projects*

December - 2017

05 December: Sean Pengelly from Lake State Railway, *LSRC's Latest Engineering and Expansion Projects*

January - 2018

23 January: Christian Riedel from Pettibone, *Speed Swing Program*

March - 2018

20 March: Phil Pasterak of WSP, *Engineering the Twin Cities Light Rail Network*

April - 2018

17 April: Niiko Rautiola of Progress Rail, *Career in the Rail Industry and Future Locomotive Technologies at Progress Rail*

18 April: Ken Filpus, MDOT

Michigan Rail Conference

August 7-9, 2018

The Michigan Tech Rail Transportation Program (RTP) worked with the Michigan DOT, Michigan State University, and a planning team of dedicated rail industry representatives to conduct the Michigan Rail Conference 2018. Under RTP's leadership the planning committee brought together more than thirty speakers and over 100 participants to Saginaw, Michigan to focus on the conference theme, "*End to End Journeys: Integrating Partners*". RTP Faculty, Staff and Students led the conference coordination and logistics. Nikkie Johnson, MDOT Office of Rail, Project Manager for Economic Development & Freight Operations and Nicholas Little, Michigan State University Director of Rail Education were the Conference Co-chairs, while David Nelson and Amanda Kerttu from Michigan Tech were the lead coordinators for the program. Two students (Alex Christmas and Kyle Dick) came to Saginaw to assist....and to enjoy the conference.

Tuesday included the golf outing that raised funds for student scholarship fund and an evening reception at the Lake State Railway's offices and yard, which featured a train ride to Midland and back on vintage passenger cars brought to the yard specifically for the conference. Wednesday featured the technical content of the conference at the Saginaw Valley State University conference center. The program included eight plenary and breakout sessions featuring industry experts in a host of passenger and freight rail topics. The keynote address was given by Jo Strang, Senior Vice President, Safety and Regulatory Policy from the American Shortline and Regional Railroad Administration (ASLRRA). The event wrapped up Thursday with a full day of field trips featuring stops at a variety of rail served shipping locations and culminated with another train ride, (again hosted by Lake State Railway Company), this time from Grayling back to the Saginaw area. The event provided an excellent venue for discussions and networking across the entire spectrum of rail industry companies and supporters in Michigan.

Committee Members & Speakers at MRC

About the Michigan Tech Transportation Institute

The Michigan Tech Transportation Institute will provide the operating structure, resources, recognition, and leadership, in a collaborative environment, that supports research, education, and outreach leading to sustainable solutions for transportation.

MTTI is an umbrella organization bringing together the cross-disciplinary centers and principle investigators conducting transportation related research and education initiatives that address national and global needs. Principal Investigators conduct transportation research under MTTI within six transportation focused areas:

- Transportation Structures including bridges and pavements. Other related areas include geotechnical, construction, and nanotechnology related to sensors.
- Transportation Materials including concrete, asphalt, steel, wood, and aggregates. Other related areas include construction, geotechnical, and nanotechnology related to sensors and materials.
- Transportation Systems including waterways, traffic/safety, construction, rail, air, public transportation, freight, intelligent transportation systems, vehicle infrastructure integration, nanotechnology related to sensors, and radio frequency identification devices.
- Environmental Aspects of Transportation includes environmental impacts, energy, carbon dioxide and other pollutants, fugitive dust, wildlife, flora and fauna, and carbon credits.
- Social Aspects of Transportation includes policy, planning, human factors, history, economics, and archeology.
- Transportation Technology Transfer includes all outreach, management systems, and workforce development programs.

Director, Pasi Lautala, MTTI

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About Michigan Technological University

Michigan Technological University is a leading public research university, conducting research, developing new technologies, and preparing students to create the future for a prosperous and sustainable world. Michigan Tech offers more than 120 undergraduate and graduate degree programs in engineering, forestry and environmental sciences, computer sciences, technology, business and economics, natural and physical sciences, arts, humanities and social sciences.

Michigan Technological University is an equal opportunity educational institution/ equal opportunity employer, which includes providing equal opportunity for protected veterans and individuals with disabilities.

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