Fall 2020

MID-AMERICA TRANSPORTATION CENTER

matc.unl.edu

In This Issue:

Moving Online: MATC Educational Outreach During COVID-19

UNL's Associate Director for Access, Inclusion, and Diversity, Mr. Radell Nared Jr. (right), describes scholarship opportunities for Native American students as well as the process to apply to a 4-year institution for the MATC Scholar's Program.

The COVID-19 pandemic has changed many plans as group events are cancelled, courses are taught online, and individuals practice social distancing. MATC hosts a series of educational outreach programs throughout the year that invite youth from grade schools, high schools, and two-year colleges to get acquainted with science, technology, engineering, and math. As a result of the pandemic, MATC transitioned all four of its signature outreach programs to an online format in 2020. This ensured the safety of our partners while still allowing us to fulfill our education mission. The four programs were the Sovereign Native Youth STEM Leadership Academy, intern program, scholars program, and the Roads, Rails, and Race Cars after school program.

The Sovereign Native Youth STEM Leadership Academy was transferred online late June. This was the first program to be completely moved online and required a lot of help from the teachers at the schools the high schoolers attended, as well as the Native American faculty, students, and leaders across the country that usually came to mentor the students. Beginning June 29th, content was posted every week with advice about higher education from Native American college students, professors, and field professionals in the STEM fields. There were also activities for the students to do each week at home that exemplified what they could learn in science, technology, engineering, and math fields.

The 2020 MATC Scholars program began early October and lasted throughout the month. Every week new videos were posted where University of Nebraska-Lincoln professors and personnel from Career Services gave advice to students registered for the program.

Anyone could register for free to view the content, but the program is geared specifically towards Native American Undergraduate Students. It was designed to prepare them to transfer from a two-year tribal college to a four-year institution, such as UNL. There were sessions on college applications, scholarships, time management, and life in general at a four-year

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college, made available to the particpants on the MATC YouTube channel.

The Roads, Rails, and Race Car (RRRC) program ended early during the Spring 2020 school session, but MATC was able to bring it back in the fall while still following social distancing and other safety rules. This too required a lot of coordination and communication between the teachers at the middle schools the RRRC program takes place and MATC's Education and Outreach Coordinator Gabriel Bruguier. Lessons on various STEM subjects are created by MATC and given to teachers each week for the students to learn, as well as an activity they can do using what they learned.

Technology has enabled MATC to stay connected and continue its educational outreach during this time, making it even more important to find new ways to reach youth considering higher education and careers in STEM fields.

Intern Program Fosters Remote Connections for Students

The MATC Summer internship program was greatly revised in 2020 due to the COVID-19 pandemic. Many businesses had reacted to the pandemic by having more of their employees work from home. Despite the issues associated with social distancing and remote work, MATC was able to support seven student interns this summer. These students gained invaluable career experience.

In addition to using technology such as email and video chat for effective communication, students also worked with a variety of engineering programs. Caleb Brunick Clark, an engineering student at the University of Nebraska Omaha, used a simulation program Vissim to build intersections and work with his team at MATC to make predictions concerning travel time accuracy and information availability. At the end of his internship he "learned that the transportation industry is far more complex than I previously thought." John Camenzind also worked remotely at MATC but was able to travel across Nebraska in order to gather data at railroad crossings while working on a project with Dr. Khattak.

Mark Akinshev has been an undergraduate research assistant at NTC's Midwest Research Safety Facility (MwRSF) since August 2018. During his MATC internship this summer he worked on projects involving cybersecurity and GNSS/GPS research and application with Dr. George Grispos. Christopher Storf worked with MwRSF for the second year in a row, but still found himself working on a variety of projects and learning new things. He worked on a bogie crash test report where he filled out several tables with data collected during the testing process, and worked with other projects in AutoCAD including camera drawings and trajectory drawings.

Peyton Weiss interned with the Great Plains Traffic Group at Felsburg Holt & Ullevig. Although he has interned with them before, this year he was required to work from home. He was still able to connect with his team through video technology to discuss projects like Green Light Lincoln and the South Dakota Department of Transportation Decennial Interstate Study, among other traffic studies.

Harry Nguyen interned at the Mid-America Transportation Center (MATC) and found that although working from home made it harder to communicate, his work schedule had more flexibility. He worked with Dr. Li Zhao, with whom he had previously taken classes with on campus, but was now able to work with on a one-on-one research basis. At the end of summer, he received the Best Intern Report award at the wrap up luncheon. All the intern reports are available on the MATC website: http://matc.unl.edu/internship/internship_success.php

The MATC intern program has been run for over 20 years and it would not be possible without the support of our sponsors. Given the difficulty faced in 2020 we are particularly grateful our sponsors were willing to help us have another successful year.

From left to right: Jon Camenzind, Christopher Storf, and Harry Nguyen.



Sydney James Awarded MATC 2020 Student of the Year

Every year MATC chooses one outstanding student to receive the Student of the Year award. The student is presented their award at the Transportation Research Board annual meeting in Washington, DC. The award is given to an accomplished, driven, and exemplary graduate student at a Mid-America Transportation school. This year it is awarded to Sydney James for her dedication and demonstration of great research.

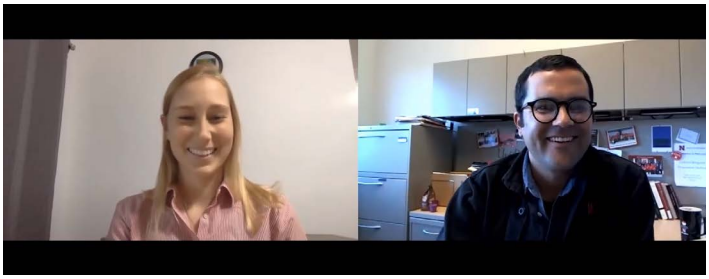
Sydney has been working with MATC since she was an undergraduate at UNL in 2017. As an undergrad, she worked on a project analyzing the safety of the highway in front of Nebraska Indian Community College in Macy, NE. She is currently working on a thesis focused on safety with the transportation of hazardous material through rural areas, many of which are home to Native American Reservations. As part of her research, Ms. James is examining crash reporting on Native American reservations in Nebraska. Her preliminary work indicates there may be a serious underreporting of crashes in these areas. If true, this is problematic because these communities might not receive the safety improvement funds for which they are entitled.

Sydney has been involved with many programs for Native Youth that MATC outreach hosts. She has been a mentor for both the after school Roads, Rails, and Race Cars program and the Sovereign Native Youth STEM Leadership Academy. The two programs are designed to help native youth in elementary, middle school, and high school learn about the STEM field and encourage them to pursue higher education through lessons and fun activities.

The Scholar's Program is another opportunity in which Native American students attending a 2-year college can learn about what they may experience by transferring to a 4-year institution to continue their education. Sydney often participates in panels during this program in which she shares her experiences as a Native American college student. She talks about "why I decided to get an engineering degree, and give insights into what got me through my moments of self-doubt – because every student has or will have those moments."

After Sydney finishes her thesis and graduates in May 2021, she has a job waiting for her as a crash reconstructionist that she is really looking forward to starting. Although she will no longer be a student, she plans to come back and participate in our outreach programs as much as possible to "share with students the many unique paths to a STEM career." Sydney is grateful for all the opportunities MATC has offered for her to get involved in outreach and research issues that are important to her.

Ms. Sydney James and MATC Education and Outreach Coordinator Dr. Gabriel Bruguier presenting during the 2020 MATC Scholars Program.



Share your News with MATC!

If you are a student, faculty member, or other affiliate of the Mid-America Transportation Center, we are eager to share news of your work and accomplishments.

Send your information to Madison Schmidt at mschmidt24@unl.edu, and it could appear in the next issue as well as MATC's website, Facebook, and Twitter.

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MATC Partnership Spotlight: Michele Blackbird Barcelona Serves as Integral Part to Success of MATC Youth Summer Academy

The Sovereign Native Youth Leadership Academy takes place every summer. One goal is to encourage Native American high school students to consider careers in science, technology, engineering, and math fields. The program uses a wide range of dedicated transportation and education professionals who participate in lessons, mentoring, and panel sessions. One important contributor has been Michele Blackbird Barcelona who is a teacher at the Umo^{n}ho^{n} Nation (Omaha Nation) Public School in Macy, Nebraska. Michelle has participated in the program since its inception in 2017 and has been instrumental in the success of the program.

In the 2020 MATC Summer Academy, lessons were distributed entirely online. Michele contributed a series of lessons and activities based on the culture and history of the Omaha Tribe, to which she is a member. Her lessons discussed tribal methods of transportation and the importance of the Omaha people's location along the Missouri River for transportation and commerce during the region's early settlement. Her activities take part in a series where students must think about how to move items from floating objects to a remote location using simple machines.

In addition to being used for the summer program, Michele's lessons will be used during the school year for the MATC Roads, Rails, and Race Cars after school program. Michele has served as a host teacher for the RRRC program since Fall of 2017 at the Omaha Nation Public School. MATC's outreach coordinator Dr. Gabriel Bruguier has worked with Michele on these outreach programs over the years and speaks for MATC when he says "we are proud to feature these lessons because they combine culture, STEM, and transportation in an outstanding way."

Middle: Michele Blackbird Barcelona, far right, watches over students as they test their foil boats in the 2019 MATC Sovereign Native Youth STEM Leadership Academy.

Bottom: Ms. Barcelona, fifth from the left, chaperoning students in the 2019 MATC Sovereign Native Youth STEM Leadership Academy.

From Seminars to Webinars: A Showcase of MATC Research

MATC is proud to present a number of guests every year to share their impact in the transportation field, many of whom are researchers at MATC affiliated Universities. Throughout the summer and fall sessions in 2020, MATC has hosted seven presentations through Zoom with researchers from Stony Brook University, University of Nebraska-Lincoln, University of Kansas, National Instruments, University of Iowa, and University of South Florida.

June 25 - Spatial Attention Mechanism for Weakly Supervised Fire and Traffic Accident Classification

Dr. Zhaozheng Yin

This project addresses the thousands of hazardous materials transport incidents that happen every year resulting in millions of dollars in damages. Dr. Yin and his team introduces a simple and effective framework that integrates the convolutional feature maps of deep Convolutional Neural Network with a spatial attention mechanism for fire and traffic accident scene classification.

July 1 - Lidar Use in Smart Transportation: Vehicles & Infrastructure

Mr. Jason Marks

This presentation covers new ways to test light detection and ranging (lidar) technology currently in use for autonomous vehicles. Mr. Marks from National Instruments identifies strategies automakers and suppliers can use to create simulation-heavy tests to deployable hardware test solutions.

July 15 - MATC Smart Barrier: Vehicle Autonomy and Lane-Keeping via Vehicle-to-Infrastructure Communication

Dr. Cody Stolle

Dr. Stolle discusses ideas on vehicle-to-roadside infrastructure communication that tracks vehicle position and provide guidance information including number of lanes, curvature, grade, and heading angle. Combined with other environmental data such as traffic congestion, weather conditions, road conditions and friction, and lane closure information, this communication would lead to a decrease in the thousands of run-off-road crashes that happen every year.

July 31 - Design and Testing of Cost-Effective lidar Systems for Transportation

Dr. Christopher Depcik and Ms. Deven Mittman

In this webinar, Dr. Depcik and his graduate student Ms. Mittman take advantage of the light detection and ranging (lidar) technology to increase transportation safety and efficiency. They create two cost-effective lidar systems for electric bicycles to monitor the surrounding area for vehicles and road obstructions to increase safety for the rider.

September 14 - Modeling Driver Behavior and Aggressiveness Using Biobehavioral Methods

Dr. Alexandra Kondyli and Dr. Vishal Kummetha

Dr. Kondyli and Dr. Kummetha have been re-working mathematical models of car-following, lane hanging, and gap acceptance to take into account additional driver-related information with respect to behavior and cognitive characteristics to improve reliability. This research focuses on replicating a more accurate car-following behavior by analyzing psychophysiological constructs.

October 23 - Development of New Design Guidelines for Protection Against Erosion at Bridge Abutments

Dr. George Constantinescu

In his project, Dr. Constantinescu conducts a series of simulations to estimate the maximum bed shear stress over the riprap apron on bridge supports. The results show some of the existing design formulas for wing-wall and spill-through abutments are not conservative enough for the larger floodplain widths, and proposes a new two-parameter design formula using data from the numerical experiments.

December 8 - Reducing Flammability for Bakken Crude Oil for Train Transport

Dr. Albert Ratner and Mr. Sazzad Parveg

Rail infrastructure is critical to the shipment of the growing crude oil industry, however, its state of disrepair can lead to derailments that cause large oil spills and devastating fires. In this webinar presentation, Dr. Ratner and Mr. Parveg propose a solution to improve fire safety during transportation through the addition of long chain polymers to crude oil before shipment.

The presentations are available on the MATC website: https://matc.unl.edu/webinarseries.php

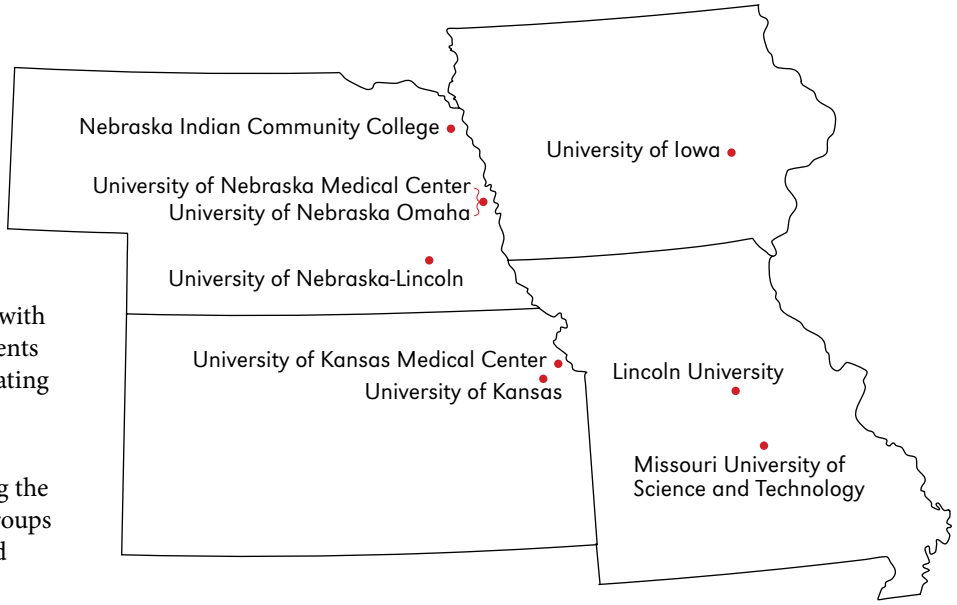
And the MATC YouTube page: https://www.youtube.com/user/MidAmericaTrans

About the Mid-America Transportation Center

Since 2006, MATC has been designated as the US DOT Region VII University Transportation Center. Region VII is composed of Iowa, Kansas, Missouri, and Nebraska. MATC is a consortium of nine universities. The University of Nebraska-Lincoln (UNL) serves as the lead institution, and MATC has its headquarters on the UNL campus.

MATC's research priority is promoting safety with an emphasis on reducing the number of incidents involving hazardous material transport, mitigating the negative effects of crashes, and improving emergency response to unexpected events.

MATC's education priority includes increasing the number of students from underrepresented groups in STEM education and transportation-related careers.



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