



MID-AMERICA TRANSPORTATION CENTER

Volume 10 Issue 1

In This Issue:

MATC Affiliates Present Research
and Meet with Partners at
TRB Conference..... **1-2**

MATC/NCIA STEM Academy Focuses
on Post-Secondary Opportunities
for Native Youth **3**

Missouri S&T INSPIRES the Next
Generation through STEM
Education Programs..... **4-5**

2018 Intern Program:
Summer of Growth..... **6**

Fall Webinar Series Offers
Diverse Perspectives from
Field of Transportation..... **7**

Scholars Program Encourages Native
American Students to Transition from
2-Year to 4-Year Institutions **8**

After-School Program Expands to
Native American K-12 Schools..... **9**

MATC Leads Formation of
AISES Chapter at UNL..... **10**

Ricardo Jacome Named MATC 2018
Outstanding Student of the Year **11**

Share your News with MATC! **11**

matc.unl.edu



University of Kansas (KU) faculty and students at TRB 2019 (from left to right): Agustin Guerra Hernandez, Hayder Al-Salih, Vishal Kummetha, Irtiza Kahn, Mustapha Rahmaninezhad, Akshay Patel, Nikhila Gunda, Sarah Morton Rupert, George Chrysikopoulos, Deven Mittman, Punyaanek Srisurin, Mahdi Al-Naddaf, and Steven Schrock.

Photo courtesy of Nikhila Gunda.

MATC Affiliates Present Research and Meet with Partners at TRB Conference

The 98th annual Transportation Research Board (TRB) conference was held at the Walter E. Washington Convention Center in Washington D.C. from January 13 – 17, 2019. The conference was expected to bring over 13,000 transportation professions from around the world to share their research and knowledge in the transportation industry.

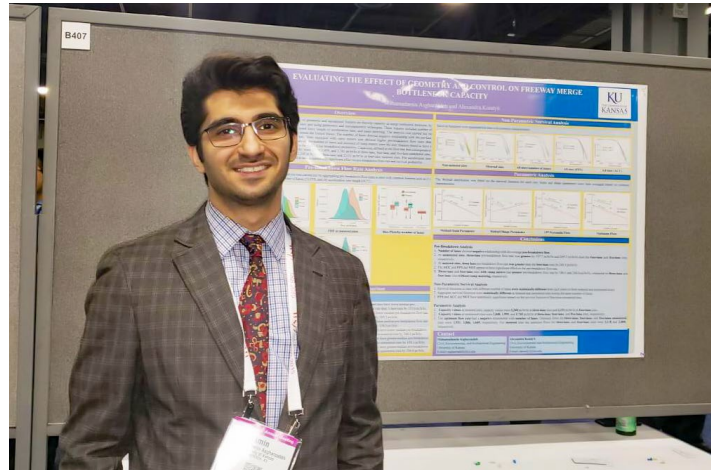
MATC affiliates were among the 5,000 presenters at the conference. Graduate student Miras Mamirov and faculty advisors Dr. Jiong Hu and Dr. Yong-Rak Kim presented their current research on optimizing concrete material for pavement applications. Ph.D. student Ernest Tufuor presented research conducted with MATC Director Dr. Laurence Rilett on the problematic performance of a computations engine to the same committee that had originally approved it. Although initially nervous about sharing their findings, “the sense of the committee’s acceptability and my contributions to the expert discussions were significant milestones in furthering my current research,” said Tufuor.

...continued on page 2



Missouri University of Science and Technology faculty (left to right) Hongyan Ma, Genda Chen, and Magdy A. Abdelrahman meet up with Yi Bao, former Ph.D. student and current assistant professor at Stevens Institute of Technology.

Photo courtesy of Missouri S&T.



KU graduate student Amin Asgharzadeh presents his poster on a paper titled, "Evaluating the Effect of Geometry and Control on Freeway Merge Bottleneck Capacity."

Photo courtesy of Irtiza Khan.



KUMC Associate Professor Shelley Bhattacharya rides the bus simulator in the exhibit hall.

Photo courtesy of Shelley Bhattacharya.



University of Nebraska-Lincoln faculty Yong-Rak Kim (far left) and Jiong Hu (far right) present research with students Shayan Gholami, Miras Mamirov, and Arman Abdigaliyev.

...continued from page 1

Students learned from presentations detailing 3D printing, innovative material testing, and modeling methods for sustainable infrastructure. Santosh-Reddy Kommidi, attending the conference for the first time, presented a poster on his research, and Gabriel Nsengiyumva enjoyed answering questions on his project, saying "my plan is to continue doing interesting state-of-the-art and state-of-the-practice research about infrastructure and materials that could have a positive impact on the life of an ordinary citizen."

The exhibit hall contained hands-on experiences for attendees including a driving simulator and autonomous bus demonstration. The bus's features were tested by someone stepping in the track and initiating a swift reaction to the blocked course by bringing the vehicle to a stop with no discomfort to passengers.

Nearly 800 sessions and workshops featured roundtable sessions—where DOT directors would outline their

locations' unique transportation challenges—and panel discussions focused on land, sea, and air transport. Graduate student Ricardo Jacome was interested in industries working to create a future where autonomous vehicles are on the road. Shayan Gholami, a first time attendee, focused on sessions related to his area of study in concrete material.

MATC took advantage of the well-attended conference by hosting a dinner for affiliates from partner research institutions. Students, faculty, and staff had the chance to meet in person researchers they have distantly collaborated with across Nebraska, Kansas, Iowa, and Missouri.

Soroosh Amelian, who attended the conference for the third time this year, reflected on the conference, saying "attending a professional conference like TRB and learning about the latest trends and how they're being used in my industry augmented my knowledge base." He plans to use this knowledge in the future, saying it "gave me something valuable to bring back and apply to my own work."

MATC/NCIA STEM Academy Focuses on Post-Secondary Opportunities for Native Youth

Left: Academy participants outside MATC headquarters.

Top right: Visiting the University of Nebraska Medical Center.

Bottom right: Students and faculty test the weight limit of their handmade boat.



Fourteen Native American high school students participated in the second iteration of the MATC and Nebraska Commission on Indian Affairs (NCIA) Sovereign Native Youth STEM Leadership Academy on June 24-29, 2018. The summer program provides students with an extended learning opportunity in science, technology, engineering, and math (STEM) subjects while exploring a wide-range of education and career opportunities after high school.

On the first day, students traveled from Omaha, Winnebago, Macy, Bloomfield, and Niobrara to attend the program. They quickly became familiar with the University of Nebraska-Lincoln campus during a scavenger hunt ending with a show at the planetarium. Throughout the week, students toured various points of interest in Lincoln and Omaha including Encompass Architects, Nebraska History Museum, Great

Plains Art Museum, and Duncan Aviation. They attended lunch with Nebraska's First Lady at the Governor's Mansion, and explored helicopters with Senator Tom Brewer, the first senator of Native American descent to serve in Nebraska's Unicameral.

The most popular activity among participants was building a boat out of PVC pipes and tarps that could hold a group of people. Dr. Chris Cornelius, UNL professor of Chemical Engineering and MATC education and diversity coordinator, and Sydney James, UNL Civil Engineering undergraduate, led a series of lessons on three types of boats that became consecutively larger and more complex.

"We are so happy that we partnered with MATC to offer this program," said NCIA Executive Director Judi gaiashkibos. "It is so gratifying to

see the kids engage in hands-on projects and witness the sense of accomplishment in their eyes as they learn that science is more than just theory in books."

Native American professionals shared their education and career experiences with students during presentations and panels. Their stories left students with a sense of confidence that they could succeed in higher education and STEM and transportation-related fields. According to the 2018 post-program evaluations, 100% of students were interested in attending college after participating in the academy. Students' interest in pursuing a career in transportation increased from 23.5% in the pre-surveys to 68.8% in the post-surveys.

MATC looks forward to exploring and creating with another group of high schoolers during the upcoming 2019 academy on June 2-7.

Missouri S&T *INSPIRES* the Next Generation through STEM Education Programs

Missouri University of Science & Technology (S&T), a partner institution of the Mid-America Transportation Center (MATC) consortium, is engaging Missouri middle and high school students in STEM programs with the support of [Inspecting and Preserving Infrastructure through Robotic Exploration \(INSPIRE\)](#), a University Transportation Center (UTC) headquartered at S&T.

On February 24, 2018, faculty and students from INSPIRE and MATC led a hands-on bridge engineering competition for 42 Missouri high school students as part of the National Society of Black Engineers (NSBE) Pre-College Initiative (PCI). PCI provides on-campus visits for African-American students who are considering a future career in math, science, computing, or engineering. PCI is sponsored by S&T's student chapter of the National Society of Black Engineers and the Student Diversity Initiatives department.

Top: Seventh and eighth grade girls participate in transportation engineering computer games led by MATC PI Dr. Xianbiao Hu during S&T's annual [EYH Conference](#).

Bottom: MoDOT Transportation Camp participants at [Stonehenge](#) on the S&T campus.

The workshop was presented by MATC Principal Investigators (PI) Drs. Ruwen Qin, Grace Yan, and Dincer Konur, Ph.D. students Hongya Qu and Xinzhe Yuan, and engineering management student Wenjin Tao. In addition to the bridge competition, participants visited the Virtual Reality lab for a demonstration of transportation research on driver behavior.





Top: Student leaders from S&T's [NSBE](#) chapter and Missouri high schoolers visit the university's Virtual Reality Driving Simulator.



Bottom: Missouri high school students engage in a hands-on bridge engineering competition at S&T during [NSBE PCI Weekend](#).

All photos courtesy of Missouri S&T.

Genda Chen, Xianbiao Hu, Grace Yan, and Hongyan Ma. Activities included an unmanned aerial vehicle demonstration by the MinerFly Team at Havener

The program was held again in 2019, exactly one year later. Dr. Qin, Ph.D. students Yuan, Abdullah Alhaj, and Md. Al-Min, and undergraduate David Doell led 40 high school student participants in the event's regular competitions and tours.

In the summer of 2018, INSPIRE and MATC hosted a one-day transportation camp with the Missouri Department of Transportation (MoDOT) on July 17. The event took place on the S&T campus as part of MoDOT's annual Youth Transportation Conference. Each year, MoDOT selects 30 students from across the state to participate in the annual camp and learn about numerous career opportunities in the field of transportation.

The 2018 campers spent a full day visiting S&T and exploring a variety of transportation-related topics. MATC PI and INSPIRE Associate Director Dr. Suzanna Long provided the welcome address. Following a presentation from the Admissions Office, students participated in a series of activities organized by MATC researchers Drs.

Center, transportation-related computer games, and a tour of the System and Process Assessment Research (SPAR) Laboratory.

In the fall, the UTCs jointly hosted transportation-engineering workshops during the Expanding Your Horizons (EYH) Conference on the S&T campus. EYH is an annual conference for seventh and eighth grade girls that is designed to help participants better understand and explore the many career opportunities available in STEM-related fields. On October 5, the Traffic Jam! workshop used computer games to demonstrate designing traffic signals and reducing traffic congestions through careful city planning. The sessions were led by MATC PI Dr. Xianbiao Hu, assistant professor of Civil, Architectural, and Environmental Engineering at S&T.

MATC is proud to partner with INSPIRE on these educational programs and looks forward to continuing outreach efforts with Missouri S&T and other partner universities.



The 2018 interns and sponsors gather together for the orientation meeting.

2018 Intern Program: Summer of Growth

For university students, internships are a taste of the “real world”, where they can dip their toes into fields they find intriguing. These opportunities offer a leg up for participants, as experience makes great candidates for future employers. Every summer, the Mid-America Transportation Center hosts an intern program to give a bright and diverse group of students these same advantages.

Sixteen undergraduate students from the University of Nebraska-Lincoln (UNL), University of Omaha, and University of Maryland Eastern Shore participated in the 2018 MATC Intern Program, more than doubling the previous year’s participation. Forty-four percent of the student participants were from groups traditionally underrepresented in the industry.

Each student was matched with a transportation professional according to the student’s interests and skills, and the needs of the organization. This year’s program welcomed eight sponsoring organizations, both new and returning, including the Nebraska Department of Transportation, Alfred Benesch & Company, City of Lincoln, and Nebraska Transportation Center’s Midwest Roadside Safety Facility.

The program began on May 11 with an orientation meeting at UNL’s Prem S. Paul Research Center, where MATC is located. Emily Wilber of UNL Career Services advised students on how to make the most of their internships. MATC Director Dr. Laurence Rilett and Research Coordinator Amber Hadenfeldt provided an overview of the program. For many participants, the orientation was an opportunity for students to meet supervisors for the first time before beginning their internship.

For twelve weeks of the summer, interns worked forty hours a week and contributed to important transportation projects in the Lincoln and Omaha areas. They assisted with improving traffic flow and used computer software to re-envision and redesign the layouts of streets and usability of crosswalks.

Towards the end of the program, MATC took the interns on a daylong technical tour of Union Pacific, Schemmer Associates, City of Omaha, and Metropolitan Area Planning Agency (MAPA). By touring organizations in both the public and private sectors, the interns learned about current projects, employment opportunities, and the differences in

working for a small firm versus a large public agency.

Marie Wagner, a UNL senior and intern at MAPA found meetings to be the most interesting as an engineering student. “Instead of working only with numbers or looking at a specific design assigned by a professor, I got to see what transportation engineers do in the wild,” she said. Marie received the award for best report at the end of the program.

Each student wrote a paper detailing their experiences over the summer and prepared a short presentation to share with fellow interns, sponsors, and MATC affiliates during the closing luncheon. Several students said their supervisors extended their positions into the fall. Other students ended the summer with a research paper or city project to their name. For the majority of interns, their internship confirmed their career goals.

“Thanks to the MATC Internship Program I can say with confidence that I have chosen the right career to pursue,” said intern William Seeger. “I am excited to see what the future has in store for me as an engineer.”

Fall Webinar Series Offers Diverse Perspectives from Field of Transportation

Since 2012, MATC has hosted over 50 webinars as a means of sharing research outputs with partners across the region and interested parties located around the world. These events, hosted online and at the University of Nebraska-Lincoln, allow faculty, students, and professionals the opportunity to learn from one another and engage in a discussion about current projects, challenges, and impacts.

MATC kicked off the 2018 fall webinar series with a presentation from Lonnie Burklund, assistant director for Transportation Public Works and Utilities at the City of Lincoln. He shared the purpose and benefits of recent City of Lincoln transportation projects including the bike plan and implementation of flashing yellow arrows for left turns. Burklund addressed the attending students as he discussed the future of transportation technologies and the important role future engineers will play in them.

On November 28, Jason Cowin spoke on the topic of Entry Control Facilities and how his department prioritizes the security, safety, capacity, and sustainability of an access point. Cowin has been with the Transportation Engineering Agency-Military Surface Deployment and Distribution Command (SDDCTEA) for the past ten years and is now the Traffic Engineering Branch Chief. The branch conducts over thirty in-house studies per year to complete their objective of saving lives, decreasing injuries, and minimizing delays at access control points.



Lonnie Burklund, City of Lincoln



Dwight Clark, AREMA past president

The following month, Dwight Clark presented on emerging technologies in the railroad industry. Clark is a past president of the American Railway Engineering and Maintenance-of-Way Association (AREMA) and retired Union Pacific Railroad General Director of Engineering Technology with over 37 years of experience in the industry. He provided an overview of AREMA and discussed the benefits of new technologies employed on today's tracks including Machine Vision, which is used for overall condition assessments including concrete and wood tie evaluations and joint bar inspections.

MATC's fall series closed with a presentation from Dr. Lilian Rezende, a Fulbright visiting scholar from the Federal University of Goiás-Brazil. Dr. Rezende conducted research with UNL Civil Engineering Professor Dr. Yong-Rak Kim on hard mix asphalt by performing multiscale analyses and strain sweep tests. She hoped to apply the results to Brazilian pavements upon her return home. During the webinar, she summarized her work at her home university, including the extensive study on phosphogypsum waste developed during production of phosphate fertilizers.

MATC looks forward to hearing from another group of experts during the spring series. In the meantime, the fall presentations can be viewed on the MATC website at: <http://matc.unl.edu/webinarseries.php>.

Scholars Program Encourages Native American Students to Transition from 2-Year to 4-Year Institutions

MATC's Scholars Program uses targeted seminars to improve the performance, recruitment, and retention of underrepresented students in STEM and transportation-related fields. The 2018 program took place October 10-12 and was attended by 18 students from Nebraska Indian Community College and 18 guest speakers and panelists from the University of South Dakota, University of Montana, Indianz.com, Vision Maker Media, Nebraska Commission on Indian Affairs (NCIA), and University of Nebraska-Lincoln (UNL).

Students had the opportunity to ask questions and receive advice on transitioning from a two-year tribal community college to a four-year university. One panel featured the members of University of Nebraska Inter-Tribal Exchange (UNITE), who discussed ways to get involved on campus and spoke of UNITE as their "home away from home", where they could connect with friends from a similar background. UNITE is a student organization within UNL dedicated to promoting academic prowess and professional development of Native American students while aiding in their personal growth and social well-being.

Judi gaiashkibos, NCIA executive director and enrolled member of the Ponca Tribe of Nebraska, served as the keynote speaker for the formal dinner. She spoke about her life, growing up in poverty and going to school with mostly non-Natives. As a single mother at 40, she went back to college to complete a bachelor's degree while working



UNL Chancellor Ronnie Green encourages students to continue pursuing higher education during the closing luncheon.

full-time. "It's never too late to go back to school," she emphasized.

Like gaiashkibos, many of the program presenters were the first in their families to go to college. Their experiences resonated with several first generation attendees, and their success served as valuable encouragement for students to take the next step in their academic journeys.

As gaiashkibos spoke about the role models in her family, the importance of building relationships, and the careers of students she mentored, she concluded, "You all have the potential to be all of those things...and we are here to support you." Her words speak directly to the heart of the MATC Scholars Program, which is to provide students with a network of professional contacts and mentors to assist them on their unique paths.



2018 Scholars Program participants at the Chief Standing Bear statue in Lincoln, NE.

Top: UNL professor Chris Cornelius (second from right) and MATC director Larry Rilett (far right) visit Winnebago Public School for a lesson on buoyancy.



Bottom left: Students make wind-up race cars and gliders during the first session at Santee Community School.

Bottom right: Students at Umóhoⁿ Nation Public School in Macy, NE, strength test their skewer bridge.



After-School Program Expands to Native American K-12 Schools

MATC's STEM after-school program Roads, Rails, and Race Cars (RRRC) began in 2010 and has since engaged over 1,850 students. The program is specifically located in schools with high proportions of students from underrepresented groups and with a high rate of participation in the free and reduced lunch program. Activities are sponsored by numerous industry partners and utilize the time and talents of 4th to 12th grade teachers from participating schools as well as mentors in graduate and undergraduate engineering programs.

The hour-long program takes place once a week at each location. Mentors present on engineering or transportation-related topics before engaging the students in an interactive activity encompassing the concepts learned. Previous activities have included constructing bridges and conducting strength tests, creating towers that can withstand simulated earthquakes, and building race cars powered by potential energy stored in a rubber band. Sessions teach students about STEM principles and opportunities in the field of transportation.

In the fall of 2017, MATC expanded the program beyond Lincoln to reservation schools in Macy and Winnebago. The following year, RRRC was implemented at Santee Community School on the Santee Sioux Reservation. "As a Native educator, I am particularly proud of our collaboration with the reservation schools to offer RRRC to their students," MATC Education and Outreach Coordinator Gabriel Bruguier reports. "We've been able to modify and develop our curriculum based on specific community needs, which reinforces the students' sense of inclusion in an ongoing learning process."

In the summer of 2018, MATC collaborated with the Ponca Tribe of Nebraska and Girls Inc. Eureka! Attendees created electrical circuits in a lesson about train signals, assembled ovens using solar energy to cook s'mores and nachos, and conducted strength tests on hand-made bridges and towers to learn about civil and structural engineering.

As the program continues to expand, MATC hopes students build a life-long passion for STEM subjects and transportation-related careers as they construct spaghetti skyscrapers and edible race cars.

MATC Leads Formation of AISES Chapter at UNL

On February 19, 2018, members of MATC, the Nebraska Commission on Indian Affairs (NCIA), and the University of Nebraska Inter-Tribal Exchange (UNITE) hosted a dinner to discuss the possibility of forming an American Indian Science and Engineering Society (AISES) chapter at the University of Nebraska-Lincoln (UNL). AISES is a national organization dedicated to increasing Native representation in science, technology, engineering, and math (STEM) education and careers.

The evening began with a meet and greet as UNL Native students networked with leaders in the Native community and members of the University of Omaha, where an AISES chapter is already established. Dr. Christopher Cornelius, UNL professor of Chemical Engineering and MATC education and diversity coordinator, spoke about his experience as a Native student in higher education and

led the discussion with attendees about developing the registered student organization (RSO).

MATC Education and Outreach Coordinator Gabriel Bruguier shared additional opportunities for students to get involved on campus through MATC's Native American STEM programs, including the summer leadership academy and the after-school program in Winnebago and Macy, Nebraska.

In November, Bruguier, Dr. Cornelius, MATC Director Dr. Laurence Rilett, NTC undergrad Sydney James, and UNITE President Angelica Solomon met to take planning to the next stage. Sydney, a mentor for MATC's after-school program, is in the process of officiating the chapter as an RSO at UNL. MATC plans to hold a recruitment event this spring and implement the chapter by fall.

Top: UNITE advisor Moises Padilla (far left) talks with student members (left to right) Kris Scott, Kendall Dawson, and Sky Morgan.

Bottom: Chris Cornelius (right) exchanges ideas with Regina Robbins, leader of the UNO AISES chapter and assistant professor of Native American Studies.



Ricardo Jacome Named MATC 2018 Outstanding Student of the Year

The Mid-America Transportation Center is honored to present the 2018 Outstanding Student of the Year Award to Ricardo Jacome. MATC chose the graduate student, attending the University of Nebraska-Lincoln (UNL), for his excellent academia and research in vehicle-to-infrastructure communication, connected and automated vehicles, and curve design.

Ricardo earned his Bachelor of Science degree summa cum laude in 2017 at the University of Texas Rio Grande Valley. During his undergraduate career he interned at the Nebraska Transportation Center in 2015 and researched the effect of railway slopes on stability and safety of vehicles.

As a graduate student, Jacome has been working as a graduate research assistant at the Midwest Roadside Safety Facility (MwRSF). He immediately joined a project and led a crashworthiness analysis of full-scale crash test data. He has also worked on a virtual lane-keeping system to alert drivers as part of the facility's "Smart Barrier Systems" project. Jacome is an advocate for MwRSF and has recruited other students to come to UNL and study at the organization. Jacome's advisor, research assistant professor Dr. Cody Stolle insists he is "confident that [Ricardo's] determination, persistence, and willingness to tackle new challenges will propel him to a leadership position and excellence in the field of automobile design and analysis."



Ricardo Jacome at the CUTC Awards Banquet in Washington, D.C.

He was also the 2018 recipient of SAE's Heinz C. Prechter Automotive Excellence Scholarship. He won the award based on his entrepreneurial proposal's creativity, ingenuity, and practicality, as well as the possible positive impact in the automotive industry.

After graduation, he plans to pursue a PhD in Mechanical and Materials Engineering (MME) at UNL and subsequently a career in academia with a focus on vehicle dynamics and safety.

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 Amber Hadenfeldt at ntc-ahaden@unl.edu, and it could appear in the next issue as well as MATC's [website](#), [Facebook](#), and [Twitter](#).

 [MidAmericaTransportationCenter](#)

 [@MATCNews](#)

 matc.unl.edu



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.

Contact Us

Mid-America Transportation Center

University of
Nebraska-Lincoln

Phone: 402-472-1975
Website: matc.unl.edu

2200 Vine Street
262 Prem S. Paul Research
Center at Whittier School
PO Box 830851
Lincoln, NE 68583-0851