Spring 2020

The UMEC Report

The newsletter for the Urban Mobility & Equity Center, a Tier 1 University Transportation Center led by Morgan State University

Interim director named for UMEC

Dr. Mansoureh Jeihani has been appointed interim director of the Urban Mobility & Equity Center (UMEC) following the retirement of director Dr. Z. Andrew Farkas in December 2019.

"I'm excited for this opportunity to direct a Tier 1 University Transportation Center that does such timely and interesting research," said Dr. Jeihani, a professor in the Transportation and Urban Infrastructure Studies department at Morgan State University. She is also the director of the Safety and Behavioral Analysis Center (SABA) Center, which uses two full-size driving simulators to study driver behavior.

In that capacity, she has been responsible for projects totaling over $3M of research dollars. Her research interests include Traveler Behavior, Traffic Safety, Transportation Planning and Modeling, and Intelligent Transportation Systems.

The principal investigator for three UMEC projects, Dr. Jeihani is also the author of *Transportation Network Modeling and Calibration*, which is now used as a university textbook, and her research has been published in numerous peer-reviewed publications including the Journal of the Transportation Research Board, Travel Behavior and Society, Journal of Safety Research, and IEEE Transactions on ITS .

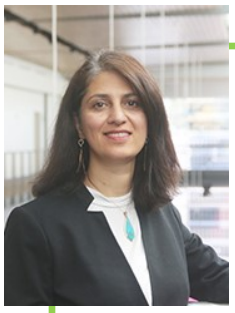
Dr. Jeihani holds 3 patents, (and has applied for 3 patents). A member of the Transportation Research Board committee ADB50 (Transportation Planning Application) and the editorial board of the Journal of Traffic and Logistics Engineering, she also chairs the Distracted Driving - Strategy 3 - Maryland Strategic Highway Safety Plan.

She earned a Ph.D. in Civil Engineering (Transportation Systems Engineering) from Virginia Tech, where she also completed a master's in Economics. She earned a master's degree in Socio-economics Systems Engineering at the Institute for Research in Planning and Development (IRPD) in Tehran, Iran, and a bachelor's in Computer Engineering at Iran National University.

Dr. Jeihani also will direct the National Transportation Center at Morgan State University, which conducts research funded by government agencies.

She is married with a daughter, and she and her family enjoy board games and movies. ▪

Director's Message



Dr. Mansoureh Jeihani

When I was appointed interim director and began work in January, I could not imagine the challenges we would face in the coming months. The university closed its campus and classes were moved online. As detailed in the story on page 6, like everyone else, we are carrying on our research as best we can.

We are strengthened by knowing that now more than ever our research matters. One of our recently completed projects used West Baltimore as a case study for the best and most cost-effective way to provide food delivery to underserved neighborhoods. Instead of trying to provide transportation to a grocery store for those living in food deserts, our researchers wondered, what if we brought fresh food to them? Little did they know when conceiving this project nearly three years ago that food delivery would become an option to avoid the virus. Another project focused on evaluating equity in evacuation, to make sure that those without cars aren't left behind when disaster strikes. Researchers created a tool to help planners identify and address these needs. The virus, of course, demanded sheltering in place rather than evacuations, but the tool helps identify neighborhoods that might need extra support, since residents can't easily drive to medical care or get household supplies.

The recent advances in technology make it possible for so many people to safely work from home — and our hearts go out to those brave health care professionals, grocery store workers and first responders who cannot do so. We expect transportation to make similar advances into our lives in the coming years as connected and autonomous vehicles become part of the traffic flow and mass transit. Several of our research projects involve developing and modeling such advances. We also use full-size driving simulators to safely determine how people will react to and use the new technology.

I hope that you and your loved ones are safe.

The Urban Mobility & Equity Center is a federally funded Tier 1 University Transportation Center led by Morgan State University in partnership with the University of Maryland and Virginia Tech. UMEC focuses on research to improve the mobility of people and goods in an environmentally sustainable and equitable manner.

UMEC

Morgan State University

CBEIS 327

1700 E. Cold Spring Lane

Baltimore, MD 21251

443-885-3666

Social Media

www.morgan.edu/umec

www.facebook.com/urbanmobilityandequitycenter

www.twitter.com/UMECresearch

Instragram: ntcumec

Director

Dr. Mansoureh Jeihani

Phone: 443-885-1873

Email: mansoureh.jeihani@morgan.edu

Associate Directors

Dr. Lei Zhang

Phone: 301-405-2881 Email: lei@umd.edu

Dr. Hesham Rakha

Phone: 540-231-1505

Email: hrakha@vtti.vt.edu

Ongoing UMEC Research Projects

Core Projects

Demand Responsive Delivery of Food in Baltimore City Food Deserts

Dr. Hyeon-Shic Shin, Morgan State University; Dr. Richard Pitts, Morgan State University

Developing Optimal Peer-to-Peer Ridesharing Strategies

Dr. Young-Jae Lee, Morgan State University; Amirreza Nickkar, Morgan State University

Energy Efficient Transportation Modeling

Dr. Hesham Rakha, Virginia Tech

How Mobility and Accessibility Affect Crime Rates: Insights from Mobile Device Location Data

Dr. Lei Zhang, University of Maryland

Optimized Development of Urban Transportation Networks 2.0

Dr. Paul Schonfeld, University of Maryland

Understanding Access to Grocery Stores in Food Deserts in Baltimore City

Dr. Celeste Chavis, Morgan State University; Anita Jones, Morgan State University

Collaborative Projects

Developing and Testing an Advanced Hybrid Electric Vehicle Eco-Cooperative Adaptive Cruise Control System at Multiple Signalized Intersections

Dr. Hao Chen, Virginia Tech; Dr. Mansoureh Jeihani, Morgan State University; Dr. Hesham Rakha, Virginia Tech

E-Bikes' Effect On Mode And Route Choice: A Case Study Of Richmond, VA, Bikeshare

Dr. Celeste Chavis, Morgan State University; Dr. Vanessa Frias-Martinez , University of Maryland

Equity in Accessibility to Opportunities: Insights, Measures and Solutions based on Mobile Device Location Data

Dr. Lei Zhang , University of Maryland

Investigating the Effect of Connected Vehicles (CV) Route Guidance on Mobility and Equity

Dr. Mansoureh Jeihani, Morgan State University; Dr. Ali Haghani, University of Maryland

Developing a Connected Vehicle Transit Signal Priority System

Kyoungho Ahn, Virginia Tech; Dr. Hesham Rakha, Virginia Tech; Dr. Young-Jae Lee, Morgan State University

Developing an Eco-Cooperative Adaptive Cruise Control System for Electric Vehicles

Dr. Hao Chen, Virginia Tech; Dr. Hesha Rakha, Virginia Tech; Dr. Cinzia Cirillo, University of Maryland

Developing and Testing an ECO-Cooperative Adaptive Cruise Control System for Buses

Dr. Hesham Rakha, Virginia Tech; Dr. Hao Chen, Virginia Tech; Dr. Mansoureh Jeihani, Morgan State University

Improving Public School Bus Operations: Boston Case Study

Dr. Youssef Bichiou, Virginia Tech; Dr. Young-Jae Lee, Dr. Hesham Rakha, Virginia Tech; Morgan State University; William Eger, Boston Public Schools

Shared Bus/Bike Lane Safety Analysis: Assessing Multimodal Access and Conflicts

Dr. Celeste Chavis, Morgan State University; Dr. Cinzia Cirillo, University of Maryland

To read more about these projects, visit www.morgan.edu/umec

Completed UMEC Research Projects

To read the final reports for any of these projects, please visit

https://www.morgan.edu/school_of_engineering/research_centers/urban_mobility_and_equity_center/research/completed_research.html

Development of Multimodal Traffic Signal Control (Core Project)

Dr. Hesham Rakha, Virginia Tech; Dr. Kyoungho Ahn, Virginia Tech

Driver's Interactions with Advanced Vehicles in Various Traffic Mixes and Flows (connected and autonomous vehicles (CAVs) electric vehicles (EVs), V2X, trucks, bicycles and pedestrians) - Phase I: Driver Behavior Study and Parameters Estimation (Core Project)

Dr. Mansoureh Jeihani, Morgan State University; Dr. Snehanshu Banerjee, Morgan State University; Md. Muhib Kabir, Morgan State University; Nashid K. Khadem, Morgan State University

Dynamic (Time Dependent) Green Vehicle Routing Problem (Core Project)

Dr. Ali Haghani, University of Maryland

E3: Evaluating Equity in Evacuation: A Practical Tool and A Case Study (Collaborative Project)

Dr. Cinzia Cirillo, University of Maryland; Dr. Celeste Chavis, Morgan State University

Evaluating Equity Issues for Managed Lanes: Methods for Analysis and Empirical Results (Core Project)

Dr. Cinzia Cirillo, University of Maryland; Dr. Dr. Javier Bas Vicente, University of Maryland

Innovative Methods for Delivering Fresh Foods to Underserved Populations (Collaborative Project)

Dr. Hyeon-Shic Shin, Morgan State University; Dr. Young-Jae Lee, Morgan State University; Dr. Paul Schonfeld, University of Maryland

Investigating the Impact of Distracted Driving among Different Socio-Demographic Groups (Core Project)

Dr. Mansoureh Jeihani, Morgan State University; also from Morgan State University: Samira Ahangari; Arsalan Hassan Pour; Nashid Khadem; Snehanshu Banerjee

Managing the Impacts of Different CV/AV Penetration Rates on Recurrent Freeway Congestion From the Perspective of Traffic Management: A Case Study of MD-100 (Core Project)

Dr. Gang-Len Chang, University of Maryland

Optimal Automated Demand Responsive Feeder Transit Operation and Its Impact (Core Project)

Dr. Young-Jae Lee, Morgan State University; Amirreza Nickkar, Morgan State University

Optimization of Emergency Traffic Patrols (ETP) Operations (Collaborative Project)

Ali Haghani, University of Maryland; Farzad Daneshgar, University of Maryland; Dr. Mansoureh Jeihani, Morgan State University; Samira Ahangari, Morgan State University; Moschoula Pternea, University of Maryland

Optimized Development Of Urban Transportation Networks (Core Project)

Dr. Paul Schonfeld, University of Maryland

Sustainable Design of Concrete Bus Pads to Improve Mobility in Baltimore City (Core Project)

Dr. Kadir Aslan, Morgan State University; Dr. Mehdi Shokouhian, Morgan State University

Traffic State Prediction: A Traveler Equity and Multi-model Perspective (Core Project)

Dr. Hesham A. Rakha, Virginia Tech

E^3: Evaluating Equity in Evacuation

The horrifying images from Hurricane Katrina linger in the nation's consciousness: the people on rooftops, trapped in attics or trying to survive in the squalor of the Superdome. In Louisiana, 1,577 people died.

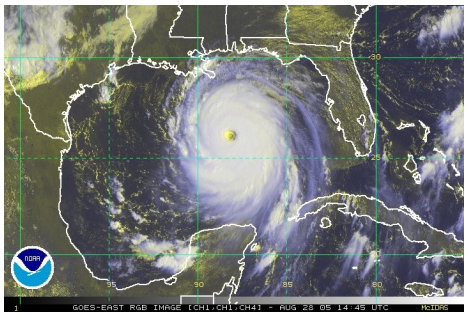
Why didn't they leave? Evacuation for those without cars, especially if they're poor, is difficult and made even more so by evacuation plans that assume citizens have cars.

The threat facing the U.S. as of this writing is a virus, which requires sheltering in place rather than evacuation, but the same lack of transportation makes it difficult for citizens to access medical care or buy groceries.

The UMEC research project **E3: Evaluating Equity in Evacuation: A Practical Tool and a Case Study** has created a new tool that planners and emergency preparedness officials can use to identify where low-income people live and estimate their car ownership.

"The tragic examples of hurricanes Katrina (2005) and Maria (2017) that cost thousands of lives have taught that the evacuation of carless, typically low-income populations is crucial," Dr. Cinzia Cirillo, the principal investigator and a professor of Civil and Environmental Engineering at the University of Maryland, said. "Therefore, the need for a tool that could help planners, first responders, and others to ensure the safety of these vulnerable populations is essential. The population synthesis method we developed in this study is applied to Anne Arundel County as a foundation for such a tool."

Anne Arundel County, Maryland, made an ideal case study since its entire eastern border is water, including the Chesapeake Bay, and 29 percent of the county is covered by rivers, creeks and streams, leaving it vulnerable to hurricanes, storm surge and flooding.



Dr. Cirillo and her research team consolidated data from the American Community Survey (ACS), Decennial Census Data, and IRS Income Data from tax returns. They fitted nine variables to a copula, a mathematical function that can capture the dependency between these nine variables and generate pseudo-observations. The results are used to generate a synthetic population.

The researchers compared the distribution of the synthetic population to real data from the Decennial Census and IRS and found it was accurate.

"This success in generating the synthetic population has been accompanied by a simple transportation application," Dr. Cirillo said. "A binomial car-ownership model has been estimated for the State of Maryland, and we created a census tract-level map."

She added, "The proposed population synthesizing method can provide reliable and granular-level input for activity-based models developed to understand the travel and behavioral pattern for individuals in cities and small towns. These studies would help planners and policy makers better examine alternative scenarios to address the needs of underserved communities and measure the accessibility of different population segments for effective and equitable evacuation planning." ▪

The full report is available at https://www.morgan.edu/Documents/ACADEMICS/CENTERS/NTC/Final%20report%20for%20E3.pdf

Researchers carry on despite COVID-19

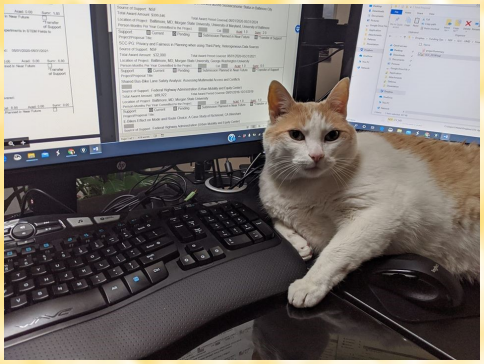
As the corona virus COVID-19 upended every aspect of American life, the Urban Mobility and Equity Center (UMEC) persevered in its research mission, adapting to the new – if anything but – normal.
UMEC is housed at Morgan State University, which announced on March 10, 2020, that it was closing early for spring break, and students would not return to campus for two weeks after the break but instead attend class online. Within days university officials decided to have all students finish the semester remotely. UMEC's partners, the University of Maryland and Virginia Tech, did the same.

"Graduate student assistants are a key part of UMEC research," UMEC Director Dr. Mansoureh Jeihani said. "They not only provide hours of labor and fresh ideas, but they also will be the next generation of researchers."

She and her students have been "talking" weekly using Google hangouts.

"I am still able to work on my research project because there is no data collection involved currently," said Morgan grad student Nkiruka "Jane" Nwachukwu. "I have adapted to the situation by creating a workstation at home which is basically a table and a chair to aid work." She also has been strictly following CDC guidelines, avoiding crowds, washing her hands and using hand sanitizer.

Dr. Paul Schonfeld, Professor in the Department of Civil and Environmental Engineering at the University of Maryland, said, "My students and I are continuing our research working mostly from our homes. We communicate by phone and by exchanging files through email. After March 30 we expect to teach our courses online and avoid in-person meetings for our research projects."



Others expect some delays but understand the need to reduce the spread of the virus.

"In my case, It's really complicated. Although I have more time to work on different aspects of our current project from home, I'm not able to collect data; therefore, this situation is delaying my research," Arsalan Hassan Pour, a graduate research assistant at Morgan, said. "I'm trying my best to not go out if it's not necessary to keep the risk of infection as low as possible, but in general, I feel good about this decision because it seems to be the best one until there's a vaccine."

Dr. Hyeon-Shic Shin, Associate Professor in the City & Regional Planning Program at Morgan, who just completed a UMEC research project, noted that "transitioning to online classes is not a small task. At this point – and I would guess other faculty are, too – I am exclusively focusing on revising all lectures for online teaching."

Carrying on with research, though, doesn't relieve worries about the virus.

"As an international Ph.D. student, my lifestyle and education status absolutely rely on scholarships and my salary as a research assistant, so I have to work in any conditions, and any news about stopping funding of projects will hurt me badly," Amirreza Nickkar, a graduate assistant at Morgan, said. "Fortunately, the nature of my current projects is purely theoretical and mathematics so there is no need to attend school/lab to use the school's facilities and I am handling my work by my personal laptop, so far so good and no complaint."

He noted that the MATLAB software he uses for coding is free for those with an .edu email, "so all I need is my laptop and a dark cup of coffee to make me focus on what Dr. [Young-Jae] Lee is asking of me!"

Nickkar does not anticipate delays and is even socializing online. "As you may know, we Persian people celebrate the first date of spring (Nowruz) as the most important holiday in our culture; however, this year we canceled all events and even small gatherings. So it was totally weird but I am so happy if doing this will prevent any issues for my loved ones and friends. I do have a concern about myself if I get this virus; I do not have any family members or relatives to care for me and I do not have enough money to pay my medical costs. Therefore, I have to be more cautious." ▪

Noted

University of Maryland Doctoral student named student of the year for 2020

Hannah Younes, a doctoral student at the University of Maryland in the fields of Geographical Sciences and Civil Engineering, has been chosen by the Urban Mobility & Equity Center as a University Transportation Center Outstanding Student of the Year for 2020.

Every year, selected students from university transportation centers are honored at the Council of University Transportation Centers banquet in January, which is the kickoff to the annual winter meeting of the Transportation Research Board (TRB), a unit of the National Academy of Sciences, Engineering and Medicine. They are chosen for their achievements and the promise of future contributions, and they are awarded $1,000 and expenses to attend TRB.

In 2016, Younes helped the Maryland Department of Transportation Maryland Transit Administration make public transportation more accessible by creating the General Transit Feed Specification for the entire state. Since 2017, she has been a research assistant at the Maryland Transportation Institute, where she has published research on low-carbon micromobility during transit disruptions and on evacuation decisions among vulnerable communities in Florida during hurricanes.

"I became interested in transportation as a child after living in Baltimore and Paris, France," Younes said. "Having grown up in both cities, I thought that one of the biggest differences was the public transportation systems. In Europe, it was a convenient and attractive option. In the U.S., it was not seen like that and most people drove cars."

A graduate of Baltimore Polytechnic Institute, she noted that "having European parents, I grew up in Baltimore using public transportation to get around. While I wanted to have a

car like my peers, I actually began to enjoy traveling by light rail and bus and liked that it reduced my carbon footprint. My goal became to promote sustainable and equitable transportation. In college, I majored in environmental science with a focus in transportation."

She completed her undergraduate degree in Environmental Science and Public Policy at the University of Maryland, College Park in 2015. ▪

TRB 2020 UMEC was well represented at the Transportation Research Board with poster and paper presentations.

Noted

Taking a Spin

Dr. Willie May (left) Morgan's Vice President for Research and Economic Development, and Provost Dr. Lesia Crumpton-Young visited the Safety and Behavioral Analysis Center.

At Least They Know They Won

They didn't get to go because the conference was canceled due to the COVID-19 virus, but (from left) grad student Md Muhib Kabir, recent graduate Dr. Snehanshu Banerjee, and grad students Nashid Khadem, Samira Ahangari, Arsalan Hassan Pour, and Istiak Bhuyan each received a national award of $1,000 to attend the 38th Annual Lifesavers National Conference on Highway Safety Priorities , which would have been held in Tampa, Florida, in March. All six are pursuing graduate degrees in transportation and infrastructure studies and are involved in UMEC research.

Building Bridges

UMEC helped sponsor the Inaugural Maryland Bridge Challenge on Jan. 31, 2020. It's designed to give middle school and high school students the experience a local bridge building competition before they compete at the national level. In case you missed the Facebook videos:

https://www.facebook.com/morganntc/videos/543915673141253/?t=0

https://www.facebook.com/urbanmobilityandequitycenter/videos/2488670194704674/?t=4

Noted

UMEC bids farewell to Dr. Farkas

Dr. Z. Andrew Farkas retired as the director of UMEC and the National Transportation Center after 36 years with Morgan State University. The event was marked with a small gathering — those of you who worked with him know that a big gathering would not have been his style — in early December.

Congrats to the next-gen researchers

Transportation & Urban Infrastructure grad students Md Muhib Kabir, Samira Ahangari, Nashid Khadem, Nkiruka Jane Nwachukwu and Arsalan Hasan Pour attended the Emerging Researchers National Conference 2020 in February.