

Miguel A. Montoya, Ph.D.
Post-Doctoral Fellow
Center for Transportation Infrastructure Systems
The University of Texas at El Paso

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EDUCATION

Ph.D. in Civil Engineering, *September 2021*

Purdue University, West Lafayette, IN, USA

Thesis Title: Environmentally Tuning Asphalt Pavements Using Phase Change Materials:
Benefits, Design, and Challenges

Thesis Advisor: Professor John E. Haddock

Area of Specialization: Materials Engineering

M.S. in Civil Engineering, *December 2016*

Purdue University, West Lafayette, IN, USA

Thesis Title: Quantifying Asphalt Emulsion-Based Chip Seal Curing Times Using Electrical
Resistance Measurements

Thesis Advisor: Professor John E. Haddock

Area of Specialization: Materials Engineering

B.S. in Civil Engineering, *March 2014*

Catholic University of Honduras, Tegucigalpa, Honduras

Magna Cum Laude

APPOINTMENTS

October 2021 – present

Post-Doctoral Fellow

Center for Transportation Infrastructure Systems
The University of Texas at El Paso

August 2014 – September 2021

Graduate Research Assistant

Lyles School of Civil Engineering
Purdue University

August 2018 – May 2020

Graduate Teaching Assistant

Lyles School of Civil Engineering
Purdue University

August 2013 – December 2013

Visiting Student

Department of Civil and Environmental Engineering
The University of Texas at San Antonio

AWARDS AND HONORS

- **Georgia Institute of Technology Focus Fellow, 2022**
This fellowship program serves as an opportunity to interact with prominent academicians about the importance of minorities pursuing a career in academia. The program is organized by the College of Engineering at the Georgia Institute of Technology.
- **New England Future Faculty Workshop Attendee, 2021**
This interdisciplinary workshop is organized by Northeastern University's ADVANCE Office of Faculty Development, Office of Institutional Diversity and Inclusion, College of Social Sciences and Humanities, Harvard Medical School, and the University of Massachusetts Amherst Graduate School.
- **McConnaughay Endowed Support Fellowship, 2016, 2017, 2018, 2019 and 2020**
Given by the Lyles School of Civil Engineering at Purdue University for a demonstration of outstanding research performance in asphalt paving materials, design, and construction. The fellowship is named in honor of Kenneth McConnaughay, responsible for multiple inventions in the asphalt field.
- **ASTM International Emerging Professional, 2020**
A competitive program that creates an opportunity with long-term benefits for new ASTM International members who have demonstrated the potential to be industry and committee leaders. Participants are selected from among a pool of nominations worldwide.
- **Dr. David R. Jones IV Scholarship, 2020**
The Dr. David R. Jones IV Scholarship is an award set up by the Association of Modified Asphalt Producers (AMAP). Preference is given to applicants with experience and interest in asphalt technology directly related to asphalt modification and innovations in material science applicable to improving asphalt materials' durability.
- **1st Place National Asphalt Mixture Design Competition Sponsored by CRH Materials Americas, Inc., 2018-2019**
A team member of the Purdue University winning team of the inaugural national asphalt mixture design competition sponsored by CRH Materials Americas, Inc. A total of 10 university teams competed to see which team could design the best performing asphalt mixture at the lowest cost. The teams were from universities with national and international reputations in asphalt teaching and research.
- **Ward K. Parr Scholarship, 2017**
Given by the Association of Asphalt Paving Technologists (AAPT), a leading association in advancing asphalt paving technology. The award winner is selected from among a pool of candidates nationwide based on applicant academic achievements' relevance and strength.
- **Leonard Wood Professional Development Award, 2017**
Given by the Lyles School of Civil Engineering at Purdue University for professional development activities for graduate students. The award is named in honor of Leonard E. Wood, a former and prominent faculty member in the Lyles School of Civil Engineering at Purdue University.

- **International Road Federation (IRF) Fellowship Grant, 2015**

Awarded to graduate students in recognition of superior achievement to pursue a graduate degree in a transportation-related field. The International Road Federation, founded in 1948, is a not-for-profit, non-political organization with the mission to encourage and promote the development and maintenance of better, safer, and more sustainable roads and road networks.

PUBLICATIONS

Peer-reviewed journals.

- **Montoya, Miguel A.**, Rahbar-Rastegar, Reyhaneh, and Haddock, John E. "Incorporating Phase Change Materials in Asphalt Pavements to Melt Ice and Snow." *International Journal of Pavement Engineering*, 2022, pp. 1-14. Crossref, doi: 10.1080/10298436.2022.2041195.
- **Montoya, Miguel A.**, Betancourt, Daniela, Rahbar-Rastegar, Reyhaneh, Youngblood, Jeffrey, Martinez, Carlos, and Haddock, John E. "Environmentally Tuning Asphalt Pavements Using Microencapsulated Phase Change Materials." *Transportation Research Record*, January 2022. Crossref, doi:10.1177/03611981211068366.
- **Montoya, Miguel A.**, and Haddock, John E. "Estimating Asphalt Mixture Volumetric Properties Using Seemingly Unrelated Regression Equations Approaches." *Construction and Building Materials*, vol. 225, 2019, pp. 829-837. Crossref, doi: 10.1016/j.conbuildmat.2019.07.266.
- **Montoya, Miguel A.**, Pouranian, M. Reza, and Haddock, John E. "Increasing Asphalt Pavement Density Through Mixture Design: A Field Project." *Asphalt Paving Technology*, vol. 87, 2018, pp. 1-29. Crossref, doi: 10.12783/aapt2018/33800.
- **Montoya, Miguel A.**, Weiss, W. Jason, and Haddock, John E. "Using Electrical Resistance to Evaluate the Chip Seal Curing Process." *Road Materials and Pavement Design*, vol. 18, no. sup4, 2017, pp. 98-111. Crossref, doi: 10.1080/14680629.2017.1389090.

Peer-reviewed conference proceedings.

- Rahbar-Rastegar, Reyhaneh, Pouranian, M. Reza, Batioja-Alvarez, Dario, Notani, Mohammad, **Montoya, Miguel A.**, and Haddock, John E. "Superpave 5: Improving Asphalt Mixture Performance." *2020 RILEM International Symposium on Bituminous Materials*, (in-press). Sciencesconf.org: isbmlyon2020:274295.
- Betancourt, Daniela, Yoo, Youngman, **Montoya, Miguel A.**, Haddock, John E., Youngblood, Jeffrey, and Martinez, Carlos. "Encapsulation of Phase Change Materials in Cellulose imanocrystalsReinforced Poly(urea-urethane) Microcapsules and their Incorporation in Asphalt for Snow and Ice Melting." *International Conference on Nanotechnology for Renewable Materials 2018*, vol. 1, 2018, pp. 55-63.
- **Montoya, Miguel A.**, Haddock, John E., and Weiss, W. Jason. "Quality Control Tool for Asphalt Emulsion-Based Chip Seal Curing Times." *Bearing Capacity of Roads, Railways and Airfields*, 1st ed., CRC Press, 2017, pp. 603-608. Crossref, doi: 10.1201/9781315100333-80.

Technical Reports.

- Haddock, John E., Rahbar-Rastegar, Reyhaneh, Pouranian, M. R., **Montoya, Miguel A.**, and Patel, Harsh. "Implementing the Superpave 5 Asphalt Mixture Design Method in Indiana." *Joint Transportation Research Program Publication*, No. FHWA/IN/JTRP-2020/12, 2020, West Lafayette, IN: Purdue University. Crossref, doi: 10.5703/1288284317127.

- **Montoya, Miguel A.**, Weiss, W. Jason, and Haddock, John E. "Quantifying Asphalt Emulsion-Based Chip Seal Curing Times Using Electrical Resistance Measurements." *Joint Transportation Research Program Publication*, No. FHWA/IN/JTRP-2017 /05, 2017, West Lafayette, IN: Purdue University. Crossref, doi: 10.5703/1288284316389.
- **Montoya, Miguel A.**, Pouranian, M. Reza, and Haddock, John E. "Demonstration Project for Enhanced Durability of Asphalt Pavements Through Increased In-place Pavement Density." *Indiana Department of Transportation and Federal Highway Administration*, December 2016.
- Wilson, Cameron, Todd, Nathan, Barrett, Timothy J., Coyle, Alex, Spragg, Robert, **Montoya, Miguel A.**, Haddock, John E., and Weiss, W. Jason. "A Mobile Concrete Laboratory to Support Quality Concrete, Technology Transfer, and Training." *Joint Transportation Research Program Publication*, No. FHWA/IN/JTRP-2016/18, 2016, West Lafayette, IN: Purdue University. Crossref, doi: 10.5703/1288284316341.
- **Montoya, Miguel A.**, Betancourt, Daniela, Notani, Mohammad, Rahbar-Rastegar, Reyhaneh, Youngblood, Jeffrey, Martinez, Carlos, and Haddock, John E. "Environmentally Tuning Asphalt Pavements Using Phase Change Materials (in press)."
- Rahbar-Rastegar, Reyhaneh, Huber, Gerald, **Montoya, Miguel A.**, Campbell, Christopher, and Haddock, John E. "Demonstration Project for Asphalt Performance Engineered Mixture Design Testing (in-review)."

PRESENTATIONS

Contributed conference/symposium presentations.

- **Montoya, Miguel A.**, Rahbar-Rastegar, Reyhaneh, and Haddock, John E. "Environmentally Tuning Airfield Asphalt Pavements Using Phase Change Materials." International Airfield and Highway Pavements Conference of the Transportation and Development Institute of American Society of Civil Engineers, Virtual Event, June 2021.
- **Montoya, Miguel A.**, Betancourt, Daniela, Rahbar-Rastegar, Reyhaneh, Youngblood, Jeffrey, Martinez, Carlos, and Haddock, John E. "Environmentally Tuning Airfield Asphalt Pavements Using Phase Change Materials." TRB Committee AFD60: Design and Rehabilitation of Asphalt Pavements Young Professionals Subcommittee Meeting, Transportation Research Board 99th Annual Meeting, Washington, D.C., January 2020.
- **Montoya, Miguel A.**, Betancourt, Daniela, Rahbar-Rastegar, Reyhaneh, Youngblood, Jeffrey, Martinez, Carlos, and Haddock, John E. "Environmentally Tuning Airfield Asphalt Pavements Using Phase Change Materials." Young Professional Research in Aviation Poster Session, Transportation Research Board 99th Annual Meeting, Washington, D.C., January 2020.
- Pouranian, M. Reza, Rahbar-Rastegar, Reyhaneh, and Haddock, John E. "Development of a Soybean-Based Rejuvenator for Asphalt Mixtures Containing High Reclaimed Asphalt Pavement Content." 5th International Symposium on Asphalt Pavements and Environment, Padua, Italy, September 2019 (presented on behalf authors: **Montoya, Miguel A.**).
- **Montoya, Miguel A.**, and Haddock, John E. "Estimating Asphalt Mixture Volumetric Properties Using Seemingly Unrelated Regression Equations Approaches." 8th European Asphalt Technology Association (EATA) Conference, Granada, Spain, June 2019 (poster-presentation).
- **Montoya, Miguel A.**, Betancourt, Daniela, Rahbar-Rastegar, Reyhaneh, Youngblood, Jeffrey, Martinez, Carlos, and Haddock, John E. "Environmentally Tuning Airfield Asphalt Pavements Using Phase Change Materials." 1st Annual Graduate Research Symposium, Civil Engineering Graduate Student Advisory Council (CEGSAC), Purdue University, West Lafayette, IN, April 2019.

- **Montoya, Miguel A.**, and Haddock, John E. "An Electrical Resistance Measurement for Moisture Content Evaluation in Asphalt Emulsion Applications." 55th Annual Petersen Asphalt Research Conference, Laramie, WY, July 2018.
- Betancourt, Daniela, Yoo, Youngman, **Montoya, Miguel A.**, Haddock, John E., Youngblood, Jeffrey, and Martinez, Carlos. "CNC-Reinforced PCM Capsules for Incorporation in Asphalt Pavement." 2018 Partnership to Enhance General Aviation Safety, Accessibility and Sustainability (PEGASAS) Annual Meeting, Purdue University, West Lafayette, IN, May 2018 (poster-presentation).
- **Montoya, Miguel A.**, Pouranian, M. Reza, and Haddock, John E. "Increasing Asphalt Pavement Density Through Mixture Design: A Field Project." 93rd Annual Meeting of the Association of Asphalt Paving Technologists, Jacksonville, FL, March 2018.
- **Montoya, Miguel A.**, and Haddock, John E. "Improving Asphalt Pavement Construction by Using a Modified Mixture Design: A Demonstration Project." 104th Purdue Road School Transportation Conference and Expo, Purdue University, West Lafayette, IN, March 2018 (poster-presentation).
- **Montoya, Miguel A.**, Weiss, W. Jason, and Haddock, John E. "Quality Control Tool for Asphalt Emulsion-Based Chip Seal Curing Times." 10th International Conference on the Bearing Capacity of Roads, Railways and Airfields, Athens, Greece, June 2017.
- **Montoya, Miguel A.**, Weiss, W. Jason, and Haddock, John E. "Using Electrical Resistance to Evaluate the Chip Seal Curing Process." 92nd Annual Meeting of the Association of Asphalt Paving Technologists, Newport Beach, CA, March 2017.
- **Montoya, Miguel A.**, Weiss, W. Jason, and Haddock, John E. "Quantifying Asphalt-Emulsion Based Chip Seal Curing Times Using Electrical Resistance Measurements," 103rd Purdue Road School Transportation Conference and Expo, Purdue University, West Lafayette, IN, March 2017 (poster-presentation).
- **Montoya, Miguel A.**, Weiss, W. Jason, and Haddock, John E. "Using Electrical Properties to Quantify Chip Seal Cure Times." 6th International Symposium on Asphalt Emulsion Technology, Arlington, VA, November 2016.

RESEARCH EXPERIENCE

Post-Doctoral Fellow, The University of Texas at El Paso, El Paso, TX, *October 2021 – present*

I am intently pursuing research and contract opportunities through the Center for Transportation Infrastructure Systems (CTIS) in asphalt pavement technology and emerging transportation engineering topics in both the public and private sectors. Supervising and mentoring graduate and undergraduate students to deliver the deliverables of research projects, including but not limited to monthly progress reports, research reports, project summary reports, video summary reports, and value of research. Interacting with a multi-disciplinary group of investigators at CTIS and other research partners in the State of Texas and the United States. Currently, I oversee CTIS efforts in the following research projects:

- Determine Impact of Field Sands on Workability and Engineering Properties of Superpave Mixtures in Texas, *Texas Department of Transportation*
- Impact of Charging Element on Performance of Asphalt Layer, *Advancing Sustainability through Powered Infrastructure for Roadway Electrification, Engineering Research Center, National Science Foundation*

Graduate Research Assistant, Purdue University, West Lafayette, IN, August 2014 - September 2021

Conducted experimental laboratory and fieldwork contributing to the dissertation project and other research projects. Prepared technical reports and assisted in the elaboration of research proposals. Research work was related to the design of asphalt mixtures, construction of durable asphalt pavements, advanced modification and characterization of asphalt materials, preservation of flexible pavements, and alternative asphalt pavement heating and cooling systems. Graduate education and research were funded through research projects sponsored by the Indiana Department of Transportation (INDOT), Federal Highway Administration (FHWA), and Federal Aviation Administration (FAA). I managed and performed research duties in the following projects:

- Using Field Electrical Conductivity Measurements for Scheduling Chip Seal Spreading/Sweeping Operations, *Indiana Department of Transportation/Federal Highway Administration*
- Demonstration Project for Enhanced Durability of Asphalt Pavements through Increased In-place Pavement Density, *Indiana Department of Transportation/Federal Highway Administration*
- Implementing the Superpave 5 Asphalt Mixture Design Method in Indiana, *Indiana Department of Transportation/Federal Highway Administration*
- Investigating the Potential to Use Phase Change Materials to Store Heat in Concrete and Asphalt Pavement Thereby Reducing the Need for Anti-Icing, *Federal Aviation Administration*
- Environmentally Tuning Asphalt Pavements Using Phase Change Materials, *Indiana Department of Transportation/Federal Highway Administration*
- Demonstration Project for Asphalt Performance Engineered Mixture Design Testing, *Indiana Department of Transportation/Federal Highway Administration*

Visiting Student, The University of Texas at San Antonio, San Antonio, TX, August 2013 - December 2013

Received specialized training in Superpave test methods (i.e., rheological and mechanical) for asphalt materials and mixtures under the supervision of Prof. A.T. Papagiannakis and Prof. Samer Dessouky. Conducted bi-monthly literature reviews on topics such as sustainable binders, harvesting energy from asphalt pavements (i.e., piezo-electric), and cool pavements.

TEACHING EXPERIENCE

Co-instructor, The University of Texas at El Paso, El Paso, TX, January 2022 – present

Serving as co-instructor in the following courses:

- CE 2334 Mechanics of Materials (3 hrs. lecture, 3 credit hrs.)
Determination of stresses, deflections, and stability of deformable bodies, including axial loading, torsion, beam bending, column buckling, and principal and compound stresses and matrix structural analysis.
 - Co-instructor, *Spring 2022*

Graduate Teaching Assistant, Purdue University, West Lafayette, IN, August 2018 – May 2020

Served as a lecturer for undergraduate and graduate courses related to engineering materials, pavement engineering, asphalt materials, and airport design. Instructed laboratory sessions to get undergraduate and graduate students acquainted with asphalt binder and mixture testing. I performed teaching duties in the following courses:

- CE 331 Engineering Materials II (2 hrs. lecture, 3 hrs. laboratory, 3 credit hrs.)
This course is a continuation of CE 231 Engineering Materials I. The students reinforce the concepts of nature and performance of materials under load, the structure of materials, elastic, inelastic, and time-dependent behavior, influences of composition and processing upon material properties, composite materials particulate systems, and chemical effects on materials.
 - Lecturer, *Fall 2018 and Fall 2019*
- CE 461 Roadway and Pavement Design (3 hrs. lecture, 3 credit hrs.)
Students are introduced to pavement design aspects, including subgrade, subbase, and base course, as well as flexible and rigid pavement design, including the design of all pavement layers and pavement drainage. Other topics discussed are soil stabilization, cost analysis, pavement selection, quality control, earthwork, and pavement evaluation and maintenance.
 - Teaching Assistant, *Fall 2019*
- CE 535 Bituminous Materials and Mixtures (2 hrs. lecture, 3 hrs. laboratory, 3 credit hrs.)
This course introduces students to the latest technology in testing and specifying asphalt materials. Class participants learn about asphalt, emulsions, cutbacks, aggregates, and asphalt mixture design. Consideration is given to the influence of chemical composition upon physical properties, desirable aggregate characteristics for asphalt mixtures, construction techniques, and current practices for determining optimum asphalt contents.
 - Laboratory Instructor, *Spring 2019*
- CE 563 Airport Design (3 hrs. lecture, 3 credit hrs.)
This class teaches students about airport design requirements derived from using aircraft design parameters and operational characteristics, airport configuration, runway length and orientation, geometric design of taxiways, exits, and runways, apron design, airspace obstacles, effects of air traffic control, lighting, and marking, asphalt pavement, and rigid concrete pavement design, pavement overlays, and evaluation of runway pavement.
 - Teaching Assistant, *Spring 2020*

MENTORING EXPERIENCE

- Pedro Chavez, Undergraduate Student at The University of Texas at El Paso, *January 2022 – present*
- Sharmila Afsha, Masters Student at The University of Texas at El Paso, *October 2021 – present*
- Christian Rodriguez, Masters Student at The University of Texas at El Paso, *October 2021 – present*
- Emily Solem, Undergraduate Student at The University of Texas at El Paso, *October 2021 – present*
- Maria Jose Zaragoza, Undergraduate Student at The University of Texas at El Paso, *October 2021 – present*
- Oscar Moncada, Masters Student at Purdue University, *January 2021 - September 2021*
- Mahdiyeh Khajehvand, Masters Student at Purdue University, *January 2021 - September 2021*

- Tandra Bagchi, Ph.D. Student at Purdue University, *August 2020 - September 2021*
- Mohammad Notani, Ph.D. Student at Purdue University, *August 2019 - September 2021*
- Samantha Bijonowski, Undergraduate Student at Purdue University, *August 2019 - May 2020*
- Christopher Allen, Undergraduate Student at Purdue University, *August 2018 - May 2020*
- Audrey Murray, Undergraduate Student at Purdue University, *August 2018 - May 2019*
- Harsh Patel, Masters Student at Purdue University, *August 2017 - May 2019*

MEDIA COVERAGE

- Phys.org. "*New Technology Paves the Way for Fewer Orange Barrels and Safer, Quicker Road Repairs.*" November 20, 2018.
<https://phys.org/news/2018-11-technology-paves-orange-barrels-safer.html>

PATENT

- Haddock, John E., Weiss, W. Jason, and Montoya, Miguel A. "Quantifying Emulsified Asphalt-Based Chip Seal Curing Times Using Electrical Properties." United States Patent Application Publication No.: U.S. 2020/0049642 A1. Publication Date: February 13, 2020 (Status: pending).

PROFESSIONAL AFFILIATIONS

- **ASTM International**, Member, *2019 - present.*
- **Academy of Pavement Science and Engineering (APSE)**, Member, *2017 - present.*
- **Association of Asphalt Paving Technologists (AAPT)**, Member, *2017 - present.*
- **American Society of Civil Engineers (ASCE)**, Affiliated Member, *2016 - present.*
- **Transportation Research Board (TRB):**
Committee on Asphalt Pavement Construction and Rehabilitation (AKC60), Friend, *2017 - 2020*, and Member, *2020 - 2023.*
Committee on Production and Use of Asphalt (AKM10), Friend, *2017 - present.*
Committee on Design and Rehabilitation of Asphalt Pavements (AKP30), Friend, *2015 - present.*
Committee on Binders for Flexible Pavements (AKM20), Friend, *2015 - present.*

SERVICE

Peer Reviews

- *Transportation Research Record: Journal of the Transportation Research Board*, Transportation Research Board Publication
- *Advances in Civil Engineering Materials*, ASTM International Journal
- *International Journal of Pavement Engineering*, Taylor & Francis Journal

- *Energy and Fuels*, American Chemical Society (ACS) Publication
ACS Reviewer Lab Certificate (*November 2019*): Successful completion of the ACS Reviewer Lab online course, demonstration of understanding of the principles of high-quality peer-review including reviewer ethics, instructions for reviewers, and tools and components for writing a constructive review.

Transportation Research Board, Standing Committee on Asphalt Pavement Construction and Rehabilitation (AKC60), Committee Member, 2020 - 2023

This committee is concerned with the construction, rehabilitation, and recycling of asphalt pavements. Areas of interest include construction methods and procedures, in-place recycling techniques, plant production issues that impact construction operations, and paving equipment.

- Panelist, TRB Webinar: Pavement Performance—Fundamentals and New Technologies, *May 2022*
- Moderator, TRB Annual Meeting: Workshop 1020 - Bridging the Gap Between Paving Fundamentals and New Technology, *January 2021*

Summer Undergraduate Research Fellowship (SURF) Virtual Symposium, Judge, 2020 and 2021

Served as a judge at the SURF virtual symposium. Provided valuable feedback to undergraduate fellows in the areas of composite materials and alloys, and material modeling and simulation.

Purdue Undergraduate Research Conference (PURC), Judge, April 2021

Served as a judge at the PURC virtual conference. Provided feedback to the student presenters on interdisciplinary topics.

Transportation Research Board Annual Meeting (TRBAM) 2020 Energy Ideathon, Organizing Committee Member, January 2020

The Energy Ideathon engages transportation scholars and practitioners in developing new ideas for achieving transportation sustainability and enables them to showcase their solutions to critical challenges in the transportation energy field. Topics of interest included urban and rural transportation energy savings, sustainable mobility systems, transportation electrification challenges, and pathways to alternative transportation fuels. This session was sponsored by the TRB Young Members Council (YMC).

13th Annual Inter-University Symposium on Infrastructure Management (AISIM), Organizing Committee Member, Purdue University, June 2017

AISIM is a full-day symposium featuring information exchange and networking opportunities primarily for graduate students, researchers, and practitioners, including infrastructure agencies, consultants, development banks, and other stakeholders.

Civil Engineering Graduate Student Advisory Council (CEGSAC), Professional Development Committee and Sports Committee, Co-Chair, Purdue University, 2014 - 2017

CEGSAC aims to build communication and camaraderie between students, faculty, alumni, and the Lyles School of Civil Engineering administration. CEGSAC is committed to communicating the civil engineering graduate student body's concerns and issues to school administrators. Some contributions are the following:

- Award Committee Member, Outstanding Faculty Mentor of Engineering Graduate Students, 2015 - 2016
- Co-author, CEGSAC New Student Manual
- Team Captain, 1st Place Turf Indoor Soccer, Co-ed Division, Spring 2016, Purdue Intramurals

SKILLS

- Computer Programming: MATLAB, Python, C, C++
- Statistic Software: SAS, LIMDEP, R, JMP, Mathcad
- Modeling Software: Weslea 3.0, AASHTOWare Pavement ME Design, FAARFIELD, LTPPBind, TEMPS, Abaqus, Simulink, AutoCAD, Autodesk Civil 3D, ETABS