
PROFILE

HAMED MAJIDIFARD

Pavement Specialist & Data Scientist

📍 LAFFERE HALL, COLUMBIA MO

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👤 <http://www.fardco.net/>

EDUCATION

Ph.D.

Exp. Grad. Dec 2020
GPA: 4.00

Civil Engineering

University of Missouri, Columbia, USA
Supervisor: Professor William Buttlar
Dissertation: *“Developing a modern recycled mix design and automatic pavement monitoring system”*

M.Sc.

Sep. 2013 to Jan. 2016
GPA: 3.63

Civil Engineering

Sharif University of Technology, Tehran, Iran
Supervisor: Professor Nader Tabatabaee
Thesis: *“Investigating the Effect of Softening Agent on the Performance Characterization of Asphalt Concrete Mixture with High RAP Content”*

B.Sc.

Sep. 2008 to Sep. 2013
GPA: 3.78

Civil Engineering

Bahonar University of Kerman, Kerman, Iran

AREA OF EXPERTISE

Pavement Engineering

- **Balanced Performance Pavement Design**
 - Thermal cracking evaluation
 - Rutting performance evaluation
 - Smart pavement design
- **Mechanics of Construction Materials**
 - Advanced modeling of asphalt concrete characterization
 - Fracture mechanics
- **Sustainable Civil Engineering Materials**
 - Asphalt binder modification using rejuvenators and crumb rubber
 - Asphalt pavement sustainability
 - RAP mixtures performance evaluation
- **Pavement management and rehabilitation**
 - Pavement preservation and life cycle cost analysis
 - Field evaluation using image processing techniques

Machine Learning

- Deep learning frameworks, Convolution Neural Network (CNN), LSTM.
- Image processing: U-Net Based Models, Crack Detection.
- Genetic Expression Programming

- Linear and Nonlinear Regression
- Supervised Learning Frameworks : Classification, Regression, Random forest
- Unsupervised Learning Frameworks: PCA, Feature Extraction, Clustering

Computer

- Python, MATLAB, Linux, SQL, R
- Tensorflow, Keras, Pytorch, OpenCV, Scikit-learn, Pandas, Matplotlib, Numpy
- Civil Related Software: ETABS, SAFE, Pavement ME, Palate, ArcGIS, LTPP binder, Civil 3D, Land and AutoCAD

PUBLICATIONS

Journals:

- **Majidifard, H.**, Jin, P., Adu-Gyamfi, Y., Buttlar, W.G, (2020). Pavement Image Dataset: A New Benchmark Dataset to Classify and Densify Pavement Distresses, Journal of Transportation Research Record. <https://doi.org/10.1177/0361198120907283>.
- **Majidifard, H.**, Adu-Gyamfi, Y., Buttlar, W.G, (2020). Deep Machine Learning Approach to Develop a New Asphalt Pavement Condition Index, Construction and Building Materials . <https://doi.org/10.1016/j.conbuildmat.2020.118513>.
- **Majidifard, H.**, Jahangiri, B., Rath, P., Urrea, L., B, Buttlar, W.G., Alavi, A.H., (2020). Developing a Prediction Model for Rutting Depth of Asphalt Mixtures Using Gene Expression Programming, Construction and Building Material.
- **Majidifard, H.**, Jahangiri, B., Rath, P., B, Buttlar, W.G, (2020). Development of a Balanced Cracking Index for Asphalt Mixtures Tested in Semi-Circular Bending with Load-LLD Measurements, Measurements.
- **Majidifard, H.**, B. Jahangiri, P. Rath, W.G. Buttlar, A.H. Alavi, A Deep Learning Approach to Predict Hamburg Rutting Curve, Road Mater. Pavement Des. (2020).
- **Majidifard, H.**, Tabatabaee, N., & Buttlar, W. (2019). Investigating short-term and long-term binder performance of High-RAP mixtures containing waste cooking oil. Journal of Traffic and Transportation (English Edition).
- Jahangiri, B, **Majidifard, H.**, Meister, J., Buttlar, W.G, (2019). Performance evaluation of asphalt mixtures with RAP and RAS in Missouri, Journal of Transportation Research Record, DOI: 10.1177/0361198119825638.
- **Majidifard, H.**, Jahangiri, B, Buttlar, W.G., Alavi, A.H., (2018). New Machine Learning-based Prediction Models for Fracture Energy of Asphalt Mixtures, Measurements. <https://doi.org/10.1016/j.measurement.2018.11.081>.
- Buttlar, W., Rath, P., **Majidifard, H.**, Dave, E. V., & Wang, H. (2018). Relating DC (T) Fracture Energy to Field Cracking Observations and Recommended Specification Thresholds for Performance-Engineered Mix Design. E-Circular TRB journal.
- B. Jahangiri, P. Rath, **H. Majidifard**, L. Urrea, W.G. Buttlar, OnlyA Comprehensive Performance Investigation of Asphalt Mixtures in Missouri: Laboratory, Field, and ILLI-TC Modeling, Road Mater. Pavement Des. In-press.

- Rath, P., **H. Majidifard**, B. Jahangiri, S. Chen, W.G. Buttlar, Laboratory and Field Evaluation of Pretreated Dry-Process Rubber Modified Asphalt Binders and Dense-Graded Mixtures, Journal of Transportation Research Record, In-press.
- B. Jahangiri, P. Rath, **Majidifard, H.**, , W.G. Buttlar, Development of a Performance-Related Framework for Asphalt Mixture Design for the Illinois Tollway, Journal of Transportation Research Record, In-press.

Conferences:

- **Majidifard H.**, Adu-Gyamfi, Y., Buttlar, W.G, (2020). Deep Learning Approach for Automatic Pavement Distresses Detection using Google-map Images, Presented in WRI Petersen Asphalt Research Conference (PARC).
- **Majidifard, H.**, Jahangiri, P. Rath, B., Buttlar, W., Alavi, A. (2020), Machine learning-based prediction models for performance of asphalt mixtures. Presented in WRI Petersen Asphalt Research Conference (PARC).
- Rath, P., J. Meister, B. Jahangiri, **H. Majidifard**, W. Buttlar. Evaluation of Engineered Crumb Rubber (ECR) Performance Characteristics, Including Warm-Mix Equivalence with Polymer, Draindown Prevention, and Release Enhancement. RILEM International Symposium on Bituminous Materials, Lyon, 2020
- Jahangiri, B, **Majidifard, H.**, Rath, P., Buttlar, W.G., 2020, Investigation of Cracking Performance of Asphalt Mixtures in Missouri, Advances in Materials and Pavement Performance Prediction (AM3P).
- **Majidifard, H.**, Jahangiri, B., Buttlar, W., Alavi, A. (2019), A Machine Learning Approach for the Prediction of Fracture Energy of Asphalt Mixtures. Presented at the 94th AAPT Annual Meeting, Ft. Worth, TX.
- Rath, P., **Majidifard, H.**, Jahangiri, B., Buttlar, W., (2019), Recent Advances in Ground Tire Rubber Recycling in Midwest Pavements, Presented at the 94th AAPT Annual Meeting, Ft. Worth, TX.
- **Majidifard, H.**, Adu-Gyamfi, Y., Buttlar, W.G, (2019). Deep Learning Approach for Automatic Pavement Distresses Detection using Google-map Images, at the 17th Annual TEAM STL Transportation Fair. Saint Louis, MO.
- **Majidifard H.**, Tabatabaee N., Buttlar W. (2018), Effect of Bio-based Oil on Performance of High-RAP Mixtures, Presented in 97th Transportation Research Board, Washington D.C., USA, January 2018.

Reports:

- Buttlar, W., Meister, J., Jahangiri, B., **Majidifard, H.**, Rath, P., (2019), Performance Characteristics of Modern Recycled Asphalt Mixes in Missouri, Including Ground Tire Rubber, Recycled Roofing Shingles, and Rejuvenators. No. cmr 19-002.
- Buttlar, W., Urra, L., Jahangiri, B., Rath, P., **Majidifard, H.** (2020), Support for Balanced Asphalt Mixture Design Specification Development in Missouri. No. cmr 20-010.
- Buttlar, W. G., Jahangiri, B., Rath, P., **Majidifard, H.**, Urra, L., Meister, J., Brown, H. (2020). Development of a Performance-related Asphalt Mixed Design Specification for Tollway, Illinois, Illinois State Toll Highway Authority: Chicago, IL, USA.

PROFESSIONAL EXPERIENCE

University of Missouri, Columbia, Missouri

Position: Research Assistant (Jan. 2017-present)

1. Developing a Prediction Software to Evaluate Pavement Condition of Asphalt Roads Using Deep-learning Approach.
 - Collecting a dataset of roads images by proposed python-based software from Google-street view API.
 - Developing an automated pavement distress detection tool by training the dataset using deep learning frameworks like YOLO and Faster R-CNN.
 - Developing a U-net based model to quantify the intensity of distresses.
 - Implementing various ML algorithms like genetic expression programming (GEP) and linear regression to develop prediction models to estimate pavement condition index by the detected distresses.
2. Developing a Machine Learning-based Prediction Models for the Performance of Asphalt Mixtures Using the Mixture Components and Test Temperatures as Inputs.
 - Developing a prediction model based on GEP algorithms to predict the DC(T) fracture energy of asphalt mixtures at low temperatures.
 - Developing a prediction model based on Convolution Neural Network (CNN) framework to predict high-temperature performance (Hamburg Wheel Track test) of asphalt mixtures.
3. Developing a decision tree tool to design high-performance asphalt mixture by selecting the optimum content of asphalt mixture components like recycling content, crumb rubber, rejuvenator, and softer binder based on their availability and their costs.
 - Understanding and Improving Heterogeneous, Modern Recycled Asphalt Mixes and Performance Characteristics of Modern Recycled Asphalt Mixes in Missouri, Including Ground Tire Rubber, Recycled Roofing Shingles, and Rejuvenators.
4. Leading graduate student to prepare proposals for multiple projects: Hyperloop ERC, Kansas city Pavement Evaluation

Position: Teacher Assistant (Jan. 2018-Jan. 2019)

- Helping with grading and lab assistant for “Pavement Design” and “Asphalt Material” courses.

Sharif University of Technology, Tehran, Iran

Position: Research Assistant (Jan. 2014-Jan. 2016)

- Investigating short-term and long-term binder performance of High-RAP mixtures containing waste cooking oil.
- Investigating effects of waste vegetable oil on mixture workability

Position: Teacher and laboratory assistant, spring 2014, fall 2014

Faragire Omran, Kerman, Iran

Position: Intern-Pavement Engineer (Jun. 2013-Aug. 2013)

Geometric road design using software like Civil 3D, Land and AutoCAD.

ACHIEVEMENTS

- Publishing journal and conference papers [Google Scholar](#)
- Regular Reviewer for 5 ISI-Indexed Journals
- Fully funded research assistantship scholarship during the four years of Ph.D. program under the grant funded by the Missouri Department of Transportation
- Association of Asphalt Paving Technologists (AAPT- WARD K. PARR SCHOLARSHIP) 2020

- Awarded Missouri Asphalt Pavement Association (MAPA) scholarship 2019
- Awarded Missouri Asphalt Pavement Association (MAPA) scholarship 2019
- Awarded the best paper presentation titled “Deep Learning Approach for Automatic Pavement Distresses Detection using Google-map Images”
- Among the top 1% of more than 25,000 test-takers in the Iranian Civil Eng. Graduate Entrance Exam, 2013
- Among the top 0.4% of more than 400,000 test-takers in the Iranian nation wide university entrance exam, 2008

REFERENCES

Prof. William Buttlar

Glen Barton Chair in Flexible Pavements

Professor in Civil and Environmental Engineering Department

University of Missouri

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Dr. Yaw Adu-Gyamfi

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University of Missouri

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Dr. Amir Alavi

Assistant Professor at Civil and Environmental Engineering Department

University of Pittsburgh

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