

# Dr. Travis J. Kessler

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Machine learning and software engineer with more than ten years of experience in academic research and open-source software development. Confident in directing teammates and students as a project manager and instructor. Recipient of multiple first-place engineering and entrepreneurial competition awards. Achievements include successfully developing machine learning models to efficiently discover cleaner, renewable, and economically-viable liquid fuels and fuel additives. Skilled in applied machine learning, data mining and processing, probability and statistics, and software engineering development and management.

## TECHNICAL SKILLS

- Python, C/C++, MATLAB
- TensorFlow/Keras, PyTorch
- Scikit-learn, NumPy, Pandas
- Jupyter Notebook
- Ray/Dask
- Predictive/statistical modeling
- Clustering and classification
- Regression and transformers
- Data visualization
- Web scraping
- AWS, GCS, Azure
- SQL (Postgres, MySQL)
- NoSQL (MongoDB)
- Git/SVN
- Docker

## EDUCATION

**PhD, Computer Engineering**  
*University of Massachusetts Lowell*  
May 2023

**B.S., Computer Engineering**  
*University of Massachusetts Lowell*  
May 2018

## EXPERIENCE

### **Research Engineer**

*AIMdyn, Inc.*

*Oct. 2023 — Present*

- Utilizes Koopman Operator Theory-based generative AI and other cutting-edge machine learning methods for the analysis, prediction, and control of complex dynamical systems
- Implements modular and scalable data processing, model training, and hyper-parameter tuning pipelines
- Administrates server cluster workflow/job manager, oversees software/application deployments, and manages network configurations

### **Graduate Research Assistant**

*University of Massachusetts Lowell Energy & Combustion Research Laboratory*

*Jan. 2019 — Sep. 2023*

- Leveraged predictive models (deep learning, graph neural networks, etc.) to advance alternative fuel research
- Investigated methods for neural network feature selection and hyper-parameter tuning, including random forest trees, principal component analysis, artificial bee colonies, and various optimization algorithms
- Evaluated predictor/target variable relationships using a variety of statistical methods
- Managed a team of undergraduate computer science/engineering students to support research efforts
- Published research efforts in *The Proceedings of the Combustion Institute*, *The Journal of Open Source Software*, and the *American Society of Mechanical Engineers Internal Combustion Engine Fall Conference*

### **Implementation/DevOps Engineer**

*Valora Technologies*

*June 2018 — Jan. 2019*

- Extracted text/numerical information from legal, financial, and government documents
- Constructed data pipelines to usher client documents from intake to delivery of data (ETL)
- Trained newly hired Implementation/DevOps engineers in data pipelining/mining workflow configuration

## Undergraduate Research Assistant

June 2015 — May 2018

University of Massachusetts Lowell Energy & Combustion Research Laboratory

- Optimized predictive models to predict chemical properties based on molecular structure (QSAR/QSPR)
- Implemented optimal neural network architectures for multidimensional input and target data
- Developed open-source machine learning, feature extraction, and hyper-parameter tuning software packages
- Published research efforts in *Fuel*, *The Journal of Open Source Software*, and the *American Society of Mechanical Engineers Internal Combustion Engine Fall Conference*

## SELECTED AWARDS & HONORS

Dean's Gold Medal for Outstanding Academic Achievement	May 2023
Computer Engineering Department Award for Outstanding Ph.D.	May 2023
Best Presentation, ASME ICEF 2019 Conference	Oct. 2019
1 <sup>st</sup> place, Symbotic Warehouse Robot Prototyping Competition	May 2018
Innovative Technology Solution, UMass Lowell DifferenceMaker 50K Idea Challenge	April 2017
1 <sup>st</sup> place, Francis College of Engineering Prototyping Competition	Dec. 2016

## PUBLISHED WORKS

- PB12. Fnu Gorky, Apolo Nambo, **Travis J. Kessler**, J. Hunter Mack, Maria L. Carreon. "CO<sub>2</sub> and HPDE Upcycling: A Plasma Catalysis Alternative". *Industrial & Engineering Chemistry Research* (2023). <https://doi.org/10.1021/acs.iecr.3c02403>
- PB11. Amina SubLaban, **Travis Kessler**, Noah Van Dam, J. Hunter Mack. "Artificial Neural Network Models for Octane Number and Octane Sensitivity: A Quantitative Structure Property Relationship Approach to Fuel Design". *Journal of Energy Resources Technology* (2023). <https://doi.org/10.1115/1.4062189>
- PB10. **Travis Kessler**, Amina SubLaban, J. Hunter Mack. "Predicting the Cetane Number, Sooting Tendency, and Energy Density of Terpene Fuel Additives". *ASME Internal Combustion Engine Division Fall Technical Conference* (2022). <https://doi.org/10.1115/ICEF2022-91163>
- PB9. **Travis Kessler**, Thomas Schwartz, Hsi-Wu Wong, J. Hunter Mack. "Evaluating Diesel/Biofuel Blends Using Artificial Neural Networks and Linear/Nonlinear Equations". *ASME Internal Combustion Engine Division Fall Technical Conference* (2021). <https://doi.org/10.1115/ICEF2021-67785>
- PB8. **Travis Kessler**, Thomas Schwartz, Hsi-Wu Wong, J. Hunter Mack. "Predicting the Cetane Number, Yield Sooting Index, Kinematic Viscosity, and Cloud Point for Catalytically Upgraded Pyrolysis Oil Using Artificial Neural Networks". *ASME Internal Combustion Engine Division Fall Technical Conference* (2020). <https://doi.org/10.1115/ICEF2020-2978>
- PB7. **Travis Kessler**, Peter C. St. John, Junqing Zhu, Charles S. McEnally, Lisa D. Pfefferle, J. Hunter Mack. "A comparison of computational models for predicting yield sooting index". *Proceedings of the Combustion Institute* (2020). <https://doi.org/10.1016/j.proci.2020.07.009>
- PB6. **Travis Kessler**, Thomas Schwartz, Hsi-Wu Wong, J. Hunter Mack. "Screening Compounds for Fast Pyrolysis and Catalytic Biofuel Upgrading Using Artificial Neural Networks". *ASME Internal Combustion Engine Division Fall Technical Conference* (2019). <https://doi.org/10.1115/ICEF2019-7170>
- PB5. Sanskriti Sharma, Hernan Gelaf-Romer, **Travis Kessler**, J. Hunter Mack. "ECabc: A feature tuning program focused on Artificial Neural Network hyperparameters". *Journal of Open Source Software* (2019). <https://doi.org/10.21105/joss.01420>
- PB4. **Travis Kessler**, Eric Sacia, Alexis Bell, J. Hunter Mack. "Artificial neural network based predictions of cetane number for furanic biofuel additives". *Fuel*, 206, 171-179 (2017). <https://doi.org/10.1016/j.fuel.2017.06.015>
- PB3. **Travis Kessler**, Gregory Dorian, J. Hunter Mack. "Application of a Rectified Linear Unit (ReLU) Based Artificial Neural Network to Cetane Number Predictions". *ASME Internal Combustion Engine Division Fall Technical Conference* (2017). <https://doi.org/10.1115/icef2017-3614>
- PB2. **Travis Kessler**, J. Hunter Mack. "ECNet: Large scale machine learning projects for fuel property prediction". *Journal of Open Source Software* (2017). <https://doi.org/10.21105/joss.00401>
- PB1. **Travis Kessler**, Eric Sacia, Alexis Bell, J. Hunter Mack. "Predicting the Cetane Number of Furanic Biofuel Candidates Using an Improved Artificial Neural Network Based on Molecular Structure". *ASME Internal Combustion Engine Division Fall Technical Conference* (2016). <https://doi.org/10.1115/icef2016-9383>