

# Dennis J. Loevlie

GRADUATE STUDENT RESEARCHER

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*Dedicated researcher pivoting from chemical engineering to computer science*

## Education

### Carnegie Mellon University

M.S. IN CHEMICAL ENGINEERING, GPA: 3.91

- Competed in several hackathons including the Covestro Hackathon, Hack the Northeast, and the Pitt Challenge.

Pittsburgh, PA

Sep. 2019 - Dec. 2020

### West Virginia University

B.S. IN CHEMICAL ENGINEERING, CUM LAUDE

- Graduated with Presidential Honors from the WVU Honors college.

Morgantown, WV

Sep. 2016 - Aug. 2019

## Publications

### Demystifying the Chemical Ordering of Multimetallic Nanoparticles [🔗]

Sep. 2022 (submission date)

ACCOUNTS OF CHEMICAL RESEARCH (UNDER REVIEW)

- Developed a novel method for calculating the cohesive energy of a bimetallic nanoparticle that overcomes major weaknesses in previous models. On the systems we investigated, our method led to a 71% reduction in the RMSE compared to the original.
- Generalized this method to be applicable to any number of metals (multimetallic nanoparticles). [GitHub](#) - [link](#)

### Size-dependent shape distributions of platinum nanoparticles [🔗]

Aug. 2022

NANOSCALE ADVANCES

- Used Boltzmann statistics to support experimental findings on nanoparticle shape and size distributions.
- Selected for the **2022 Popular Advances collection** which includes articles which have been very well received by the community.

### Resolving Electrocatalytic Imprecision in Atomically Precise Metal Nanoclusters [🔗]

Jan. 2022

CURRENT OPINIONS IN CHEMICAL ENGINEERING

- Electrocatalysis applications of ligand-protected nanoclusters.
- Prospective section on current and possible future applications of machine learning in the field.

## Research Experience

### Computer-Aided Nano and Energy Lab (CANELa)

University of Pittsburgh

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June 2021 - PRESENT

- Developed a novel method for calculating cohesive energies of metal nanoparticles that led to a 71% improvement to the previous model.
- Applied quantum/statistical mechanics through Density Functional Theory, Boltzmann statistics, and mixed integer optimization using the genetic algorithm to better understand structure property relationships of metal nanoparticles.
- Organized and presented in several machine learning and software development meetings within the CANELa research group. Notable presentations include: version control using git/GitHub, an introduction to PyTorch and logistic regression, and developing custom Python packages.
- Mentored members of the group (grad and undergrad) about public [🔗] and private code I have developed, ML fundamentals, building models with PyTorch, and evaluating ML results.

### The Kitchin Group

Carnegie Mellon University

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Dec. 2019 - Dec. 2020

- Recreated image analysis tools in Python (originally in Mathematica) to be interactive, fast, and intuitive.
- Trained and deployed a convolutional neural network classifier to extract valuable information from experimental image data.
- Developed a Python package, `nb_search` [🔗], to efficiently sort through, locate and open Jupyter Notebook files.
- Regressed parameters and used them to cluster different bimetallic catalysts.

### Control, Optimization and Design for Energy and Sustainability (CODES)

West Virginia University

UNDERGRADUATE RESEARCHER

Apr. 2017 - Aug. 2019

- Modeled, optimized, and economically evaluated a chemical process in MATLAB — Funded by the National Science Foundation.

## Volunteering and Outreach

2022	<b>Fundraising</b> , Organized a profit sharing event with Chipotle to raise funds for people suffering from the flooding in Pakistan	Leadership
2022	<b>Outreach</b> , Volunteered for and helped organize an outreach event with a local public school to help encourage students to consider STEM	Leadership
2021	<b>STEM Education</b> , Volunteered at the Carnegie Science Center, where I conducted science experiments with and answered questions from elementary students	Volunteering

## Work Experience

### KEF Robotics

COMPUTER VISION ENGINEER

Pittsburgh, PA

Jan. 2023 - Start of Ph.D.

- Responsibilities will include: conducting literature reviews on computer vision topics and developing software for tethered drone autonomy.

### AithELITE

DATA SCIENTIST/SOFTWARE ENGINEER

Pittsburgh, PA

Dec. 2020 - May. 2021

- Developed web scraping scripts using BeautifulSoup and Selenium to automate data retrieval and updating.
- Developed and automated the feature engineering with Numpy and Pandas.
- Applied machine learning algorithms using Numpy and SkLearn to generate intelligent predictions and insights from the data.
- Built and maintained relational (MySQL) and graph (Neo4J) databases, hosted on AWS.
- Built the frontend and backend of the AithELITE EliteAI website with Django, hosted on AWS.

## Projects

### SkinsAI [🔗]

Pitt Challenge Hackathon

COMPUTER VISION, DEEP LEARNING

- Developed a free-access, diagnosis tool for classifying moles as benign or malignant.
- Classification model was a small convolutional neural network built with PyTorch and website was built with Django web-framework and deployed with Heroku.

### Question Answering Model [🔗]

CMU Course

NATURAL LANGUAGE PROCESSING

- Developed models using SpaCy that can generate questions from a provided text and also find answers to questions about a given text.

### Disparity Map Generation [🔗]

CMU Course

COMPUTER VISION, DEEP LEARNING

- Modified the PSMnet architecture for disparity map generation to be used for 3D object detection.
- Implemented asymmetric convolutions and redesigned the SPP module of the PSMNet using residual blocks.
- Modifications led to a 53.65% reduction in parameters and a higher 3-pixel accuracy on I.R. images.

### Speech to Text Transcription [🔗]

CMU Course

DEEP LEARNING

- Implemented a combination of recurrent neural networks (more specifically BLSTMs) and dense networks for speech to text transcription.

### American Sign Language (ASL) Active Learning [🔗]

Personal Project

COMPUTER VISION, DEEP LEARNING

- Developed a GUI that uses machine learning techniques such as a vanilla convolutional neural network classifier and YOLOv3 object detection to tell a user if they have correctly signed a letter in American sign language.

## Honors & Awards & Activities

### UNIVERSITY OF PITTSBURGH

- |      |   |                |
|------|---|----------------|
| 2022 | <b>2nd Place</b> , The Pitt Challenge, built SkinsAI which was awarded 2nd place overall (\$2,000 cash prize) out of 24 teams from Pittsburgh universities, including CMU | Pittsburgh, PA |
| 2022 | <b>GSA President</b> , Elected President of the Chemical Engineering Graduate Student Association   | Pittsburgh, PA |

### CARNEGIE MELLON UNIVERSITY

- |      |  |                |
|------|--|----------------|
| 2020 | <b>3rd Place</b> , Chemical Engineering Masters Student Association Research Forum, Poster Competition | Pittsburgh, PA |
| 2020 | <b>Category Winner</b> , The Pitt Challenge, "Largest Impact on Healthcare Workers" Category           | Pittsburgh, PA |

### WEST VIRGINIA UNIVERSITY

- |      |   |                |
|------|---|----------------|
| 2019 | <b>1st Place</b> , AVEVA's National Simulation Competition (Advanced Category)                            | Morgantown, WV |
| 2019 | <b>Vice President</b> , American Institute of Chemical Engineers (WVU Chapter)                            | Morgantown, WV |
| 2018 | <b>2nd Place</b> , Computing and Process Control Division at the National 2018 AIChE Poster Presentations | Morgantown, WV |
| 2018 | <b>Member</b> , Omega Chi Epsilon Chemical Engineering Honor Society                                      | Morgantown, WV |

## Relevant Courses

- |      |  |                |
|------|--|----------------|
| 2021 | <b>Natural Language Processing</b> , Carnegie Mellon University (cross-registration), Graduate | Pittsburgh, PA |
| 2020 | <b>Introduction to Deep Learning</b> , Carnegie Mellon University, Graduate                    | Pittsburgh, PA |
| 2020 | <b>Introduction to Machine Learning</b> , Carnegie Mellon University, Graduate                 | Pittsburgh, PA |
| 2019 | <b>Linear Optimization (supply chain focused)</b> , Carnegie Mellon University, Graduate       | Pittsburgh, PA |
| 2017 | <b>Numerical Methods and Optimization</b> , West Virginia University, Undergraduate            | Morgantown, WV |