Sarah E Howerter

Masters in Civil and Environmental Engineering Student

Contact
44 North Ave Apt #2
Burlington, VT 05401
(912) 660-4321
sehowerter@gmail.com

EDUCATION

- **University of Vermont,** Burlington, VT — *Currently pursuing Masters in Civil and Environmental Engineering*

2017 - Present

Advisor: Dr. Lisa Aultman-Hall
Focusing in Transportation Systems and Modeling.

Certificate of Graduate Study: Complex Systems at the Vermont Complex Systems Center

Masters Thesis Topic: Modeling Electric Vehicle Energy Demand and Regional Dispatch for New England and New York State

Courses: Environmental Systems Engineering, Transportation Systems Engineering, Principles of Complex Systems, Transportation Modeling and Planning, Complex Networks, Statistical Methods, Modeling Complex Systems, Convex Optimization, Data Science, Smart Grid, Data Ethics (audited)

- **City College of San Francisco,** San Francisco, CA — *Continuing Education & Masters Prerequisites*

2013 - 2016

Focused on math, science, and engineering studies to prepare for graduate studies in civil engineering.

Courses: Trigonometry, Calculus I, II, & III, Differential Equations, Introductory Physics, Classical Mechanics for Scientists and Engineers, Electricity & Magnetism for Scientists and Engineers, Intro To Engineering & Technology Lab, Intro to Engineering: The Profession, Engineering Software Tools and Design, Engineering Mechanics- Statics, Engineering Drawing and Manufacturing, Welding Processes, Intro to Programming C++, Intro to Chemical Principles, Cosmic Evolution, Observational Astronomy, Solar System

- **Savannah College of Art & Design,** Savannah & Atlanta, GA — *Bachelors of Fine Art in Printmaking*

2008 - 2011

Completed senior thesis which consisted of a written thesis and public art show of works in printmaking, installation, and book arts.
https://cargocollective.com/seh

CONFERENCES

- Transportation Research Board Annual Meeting 2018 - Attended
- Transportation Research Board Annual Meeting 2019 - Presented two research projects at survey methods and bicycle research poster sessions
- Symposium on Complexity in Health and Wellness 2018 - Attended

SKILLS

Programming: Python, LaTeX, R, Julia, Matlab, C++, Arduino, VBA, & HTML

Software: TransCAD, Github, SQlite, Excel, SPSS, Adobe CS, MS Office Suite

Research: Data collection, analysis, & organization, Data visualization, Statistical Modeling, NLP, Choice Modeling, Transportation Modeling Methods, Network Modeling, Analysis and Structure Detection

Engineering: Transportation Engineering, Traffic Flow Theory, Traffic Assignment, Facility Design, Optimization, Technical Drawing & Blueprint Reading, Survey Methods and Design

Professional Communication, Management, Public Speaking, and Customer Service experience

AWARDS AND HONORS

CH2M Hill Engineering Firm Scholarship Recipient Awarded while a student at CCSF in 2014 for demonstrated enthusiasm for science and engineering in both academic and extracurricular activities.

CCSF Math Department Scholarship Nominated for the department scholarship for noteworthy academic performance.

SCAD Scholarship Awarded for portfolio submission.

SCAD Honors Scholarship for academic and artistic merits.

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SELECTED WORK EXPERIENCE

- **The University of Vermont,** Burlington, VT — *Graduate Research Assistant at the Transportation Research Center*
  Ongoing
  Worked on multiple research projects under Lisa Aultman-Hall including looking at the influence of social network geography on long-distance travel behavior and the analysis of bicyclist race and ethnicity.

- **The Outdoor Gear Exchange**, Burlington, VT — *Inventory Control Specialist*
  2016 - 2018
  Promoted from floor position after first few months to work in a small specialized team to ensure the accuracy of the inventory at the Outdoor Gear Exchange both in the physical realm and the database. Data management work in Excel and POS system as well as development and fixing of interdepartmental programs in Excel VBA.

- **Ornot Bike,** San Francisco, CA — *Administrative Assistant*
  2015 - 2016
  Worked as primary employee to small bike apparel company owner/designer. Duties included online shop administration, customer communications and warranty procedures, and management/creation of web media and content, as well as customer accounting.

Additional previous employment available upon request.

RESEARCH & PROJECTS - Transportation Research and Modeling

- *Exploring the Influence of Social Network Geography on Long-distance Travel Behavior*

  Presented as a poster at TRB Annual Meeting 2019 and at the UVM Student Research Conference in Spring 2018. Analyzed TRC administered survey data of personal social networks and long distance travel to look at the relation of social network spatial extent and distribution to long-distance travel rates. Came up with a method for classifying social networks' spatial distributions by taking measures of the distances from respondent's home to their social contacts' home as well as from all of their contacts' to each other and used K-means clustering to group respondents into social network types. Most work was done in python with utilization of Google Maps API.

  Worked under Lisa Aultman-Hall at the UVM Transportation Research Center 2018.

- *Analysis of Bicyclist Race and Ethnicity from Eight Travel Surveys in the United States*

  Presented as a poster at TRB Annual Meeting 2019. Recoded and aggregated travel survey data from 8 different large household travel surveys (NHTS 2009 & 2017, CHTS, NYMTC Regional Household Travel Survey, CMAP Travel Tracker Survey, ARC Regional Travel Survey, Household Travel Survey for the DVRPC, MRTS). Came up with a standardization of race & ethnicity categories and analysed bicycling and bicycle commuting rates across different races throughout the United States using Chi-square test of proportions and multi-level modeling. Most work was done in R with some additional data visualization work in python.

  Worked with Dillon Fitch from UC Davis and Lisa Aultman-Hall at the UVM Transportation Research Center 2018.

- *Optimizing All-Day Electric Vehicle Charging Schedules Given Charging Infrastructure Scenarios and Travel Pattern Constraints*

  Final project for Convex Optimization course with written report and presentation. Optimized the scheduling of electric vehicle charging demand given a sample of actual vehicle travel schedules from the 2017 NHTS over a 24 hr period and three different charging infrastructure scenarios: home only, universal, and random. This was a cost based optimization that took into account charge depletion, travel constraints, and baseline demand. Data analysis was done in python and the optimization model was done using Julia's JuMP and solved using Gurobi.

  Course instructor: Mads Almassalkhi

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□ *Defining Type of Cyclist based on Travel and Activity Patterns*

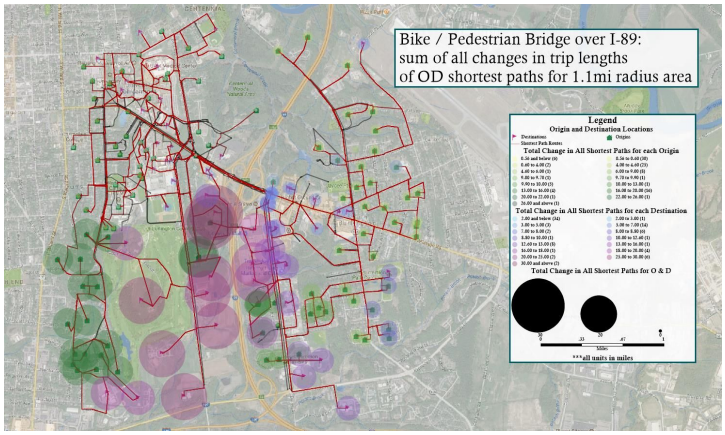
Additional graduate research project for Transportation Modeling course, presented by Jim Sullivan at the NHTS Conference 2018. Implemented a behavioral cohort analysis to classify bicyclists on their bicycle travel behavior alone using the 2017 NHTS survey data. Classified cyclist by creating an adjacency matrix of Jaccard Similarity Scores between every pair of respondents based on the timing of their bicycle trips, resulting in an induced network, which was then clustered using the Louvain Method to create activity classification groups. All analysis and coding was done in python.

Worked under course instructor, Jim Sullivan.

□ *Changes in Shortest Paths for Bike/Pedestrian Travel Across I-89 Pre/Post New Bridge*

Final project for Transportation Modeling course with written report. Used TransCAD software to look at the road and bike/walk paths in a 1.1 mile radius region around the I-89 proposed multi-use bridge location. Network nodes were assigned as either origins or destinations (or both) based on whether they were in commercial or residential areas and a shortest paths algorithm was run on the network twice, once without and once with the new bridge. The difference of the two shortest path matrices was analyzed and maps were created to visualize which areas would be affected most. Thanks to Stantec for providing the scoping study final report draft.

Course instructor: Jim Sullivan



RESEARCH & PROJECTS - Complex Systems and Data Science

□ *Investigating the hedonometer macrotrend via sentiment trends in the news*

Final project for Principles of Complex Systems course with written report and oral presentation. Wrote a python program that extracted the text of 9 years of news articles from theguardian.com, by section, and used the labMT (language assessment by mechanical turk) sentiment scores to analyze the sentiment of the news content over time and draw correlations to Twitter sentiment over the same time period. All analysis and coding was done in python.

Course instructor: Peter Sheridan Dodds

□ *Ratiometrics of Twitter*

Final project for Complex Networks course with written report and oral presentation. Looked into the social media phenomenon on Twitter known as "the ratio", by looking at famous Twitter accounts', politicians', and celebrities' tweet ratio of reply to retweet to like. We gathered samples of replies from recent tweets and analyzing the sentiment of the replies against the normalized ratios to gather quantitative insight into this venue of public response. All analysis and coding was done in python.

Course instructor: Peter Sheridan Dodds

□ *Comparison of voting systems in a complex opinion space*

Final project for Modeling Complex Systems course with written report. Created a model for community elections that enables comparison of voting strategies with respect to voter satisfaction maximization and campaign transparency. The model was written in python and is non-spatial, agent-based, and non-temporally influenced. Agents' opinions were multi-dimensional and stochastically generated while voting algorithms were deterministically run. All analysis and coding was done in python.

Course instructor: Laurent Hébert-Dufresne

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- *Vehicular interaction and movement for simple traffic configurations*

Project for Modeling Complex Systems course with written report and oral presentation. Designed and implemented a cellular automata model of a simple traffic system containing cars and bicycles to investigate the interaction between the speeds, general movement, and congestion. All analysis and coding was done in python.

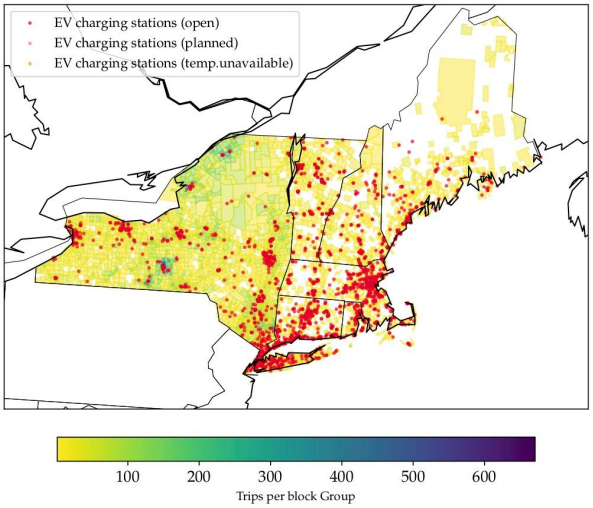
Course instructor: Laurent Hébert-Dufresne

- *Predicting Future Electric Vehicle Charging Infrastructure Placement*

Final project for Data Science course with written report and presentation. Looked at current EV charging stations in New England and New York State and measured correlations between charging station densities to population, housing, and NHTS trip densities as well as trip purposes at the census block group level. Data sources were in json, shapefile, and csv formats and all coding was done in python.

Course instructor: James Bagrow

Sample code can be provided upon request.



ORGANIZATION MEMBERSHIP

Institute of Transportation Engineers, Young Professionals in Transportation, Complex Systems Center Computational Storylab Research Group, Transportation Research Center Combined Bike Research Group, Friend of Transportation Research Board Standing Committees on Visualization in Transportation, Transportation Network Modeling, Transportation Intelligent Transportation Systems, and Environmental Justice in Transportation.

PUBLICATION

- *Defining Type of Cyclist Based on Travel and Activity Patterns* 2018
  J Sullivan, S Howerter
  2018 National Household Travel Survey Workshop, 38

- *Advancing Understanding of Long-Distance and Intercity Travel with Diverse Data Sources* 2018
  J Dowds, C Harvey, J LaMondia, S Howerter, H Ullman, L Aultman-Hall
  National Center for Sustainable Transportation