

# Irfan Batur

School of Sustainable Engineering and the Built Environment, Arizona State University  
660 S. College Avenue, Tempe, Arizona, 85281  
[ibat@asu.edu](mailto:ibat@asu.edu) • <https://ibat.github.io/>

[Last edit: 1/18/2023]

## CURRENT POSITION

**Associate Research Technologist, Arizona State University, Tempe, AZ**

Apr 2022 – Present

## RESEARCH INTERESTS

- Travel Behavior
- Sustainable and Equitable Transportation
- Emerging Transportation Technologies
- Travel Demand Forecasting
- Smart Cities
- Machine Learning

## EDUCATION

**Arizona State University**, Tempe, AZ, United States

**PhD, Civil, Environmental and Sustainable Engineering**, 2019 – Present

Advisor: Ram M. Pendyala, PhD

**Istanbul Sehir University**, Istanbul, Turkey

**MS, Industrial and System Engineering**, 2014

Advisor: Muammer Koc, PhD

**TOBB Economy and Technology University**, Ankara, Turkey

**BS, Industrial Engineering**, 2012

Advisors: Sibel Alumur Alev, PhD and Hakan Gultekin, PhD

## PROFESSIONAL EXPERIENCE

**Associate Research Technologist, Arizona State University, Tempe, AZ**

May 2022 – Present

Worked at TOMNET, a US-DOT Tier 1 University Transportation Center

- Led multiple research projects, as PI or Co-PI, totaling more than \$500,000 in funding
- Engaged in proposal writings for new projects and research centers
- Mentored graduate students working at the Center
- Developed open-source software and tools for the public, planners, and policymakers

**Research Communications & Technology Transfer Coordinator, TOMNET UTC, Tempe, AZ**

May 2022 – Present

- Assisted PIs in compiling information needed to disseminate their research findings
- Explored innovative strategies and ways to effectively transfer technologies to the industry
- Managed internal and external communications of the Center
- Organized research seminars and public panels

**Graduate Research Associate, Arizona State University, Tempe, AZ**

Aug 2019 – Apr 2022

Worked at TOMNET, a US-DOT Tier 1 University Transportation Center

Involved in the following projects:

- TOMNET Transformative Transportation Technologies Survey
- Transportation System Plan 2040 for Maricopa County Department of Transportation
- Development of the Activity-Based Model for the Qatar Strategic Transportation Model
- Observing Human-Scale Urban Air Pollution and Temperature Using Low-Cost Sensors

**Graduate Teaching Associate, Arizona State University, Tempe, AZ**

Aug 2019 – Present

Assisted courses:

- CEE 598 Activity Travel Behavior Model (Fall 2022/Prof. Ram M. Pendyala)
- CEE 372 Transportation Engineering (Fall 2021/Prof. Ram M. Pendyala)
- SOS 546/CEE 506 Life Cycle Assessment (Spring 2021/Prof. Mikhail Chester)
- CEE 474/CEE 598 Transportation Systems Planning (Fall 2020/Prof. Mikhail Chester)
- CEE 384 Numerical Methods for Engineers (Fall 2020/Prof. Yingyan Lou)
- CEE 372 Transportation Engineering (Spring 2020/Prof. Yingyan Lou)
- CEE 372 Transportation Engineering (Fall 2019/Prof. Ram M. Pendyala)

<b>Research Specialist, Arizona State University, Tempe, AZ</b> Worked for Prof. Ram M. Pendyala and involved in multiple projects on travel behavior	Sep 2018 – Aug 2019
<b>Visiting Scholar, TOMNET UTC, Arizona State University, Tempe, AZ</b> Involved in multiple research projects on travel behavior	Apr 2018 – Aug 2018
<b>Research Assistant, Qatar Foundation, Doha, Qatar</b> Assisted courses: SENS 501 Research Methods and Ethics [HBKU]	Aug 2015 – Sep 2018
<b>Graduate Teaching Assistant, Yildiz Technical University, Istanbul, Turkey</b> Assisted courses: END 3232 Simulation	Jan 2014 – Sep 2015
<b>Graduate Teaching Assistant, Istanbul Sehir University, Istanbul, Turkey</b> Assisted courses: - IE 321 Deterministic Models in Operations Research - ENGR 246 Manufacturing Processes - ENGR 105 Introduction to Engineering	Sep 2012 – Jan 2014

## GRANTS AND SCHOLARSHIPS

TOMNET University Transportation Center, 2022-2023 | Lead PI on \$101,250 grant to study the relationship between ridehailing services usage and household vehicle availability  
TOMNET University Transportation Center, 2022-2023 | Co-lead PI on \$100,370 grant to investigate the well-being implications of changes in activity-travel during Covid-19 pandemic  
TOMNET University Transportation Center, 2022-2023 | Lead PI on \$102,510 grant to analyze the factors influencing the willingness to use AV-based ridehailing services in the future  
TOMNET University Transportation Center, 2022-2023 | Co-lead PI on \$100,620 grant to identify vulnerable groups in the context of access to food during the Covid-19 pandemic  
TOMNET University Transportation Center, 2022-2023 | Co-lead PI on \$99,930 grant to study the mode use evolution during Covid-19 pandemic in the U.S. for the future of transit  
Arizona State University 2021-2022 Graduate College Travel Grant, Mar 30, 2022.  
Arizona State University 2021-2022 Graduate College Travel Grant, Jan 2, 2022.  
Full Scholarship (tuition fee waiver + stipend) for M.S. studies from Istanbul Sehir University, Turkey.  
Full Scholarship (tuition fee waiver + stipend) for B.S. studies from TOBB Economy and Technology University, Turkey.

## PROFESSIONAL SERVICE AND RECOGNITION

### Honors and Awards

- Pyke Johnson Award by Transportation Research Board for the best paper in planning and environment, 2022.
- Arizona State University 2021-22 GPSA Outstanding Research Award, Spring 2022.
- Best Presentation Award at the 2021 ITS Arizona Students' Transportation Summit, Apr 30, 2021.
- Honor Student, TOBB Economy and Technology University, 2007 – 2012.
- Best Poster Award at the Senior Project Contest, TOBB Economy and Technology University, Turkey, 2011.
- Ranked ~2000th among 1.7 million participants in the National University Entrance Exam of Turkey, 2005.

### Professional Affiliations

- Affiliate, Transportation Research Board
- Member, International Association for Travel Behavior Research
- Member, American Society of Civil Engineers

### Professional Services

Reviewer:

- Transportation Research Record, Journal of the Transportation Research Board
- Journal of Transport Geography
- Transportation Research Part E: Logistics and Transportation Review
- IATSS Research
- Sustainable Cities and Society

Treasurer, ASU-ITE Student Chapter 2021-2022

## PUBLICATIONS

### Journal Articles (Published/Forthcoming)

- Batur, I.**, Asmussen, K. E., Mondal, A., Khoeini, S., Magassy, T. B., Pendyala, R. M., & Bhat, C. R. (2022). Understanding Interest in Personal Ownership and Use of Autonomous Vehicles for Running Errands: An Exploration Using a Joint Model Incorporating Attitudinal Constructs. *Transportation Research Record*, 03611981221107643.
- Magassy, T. B., **Batur, I.**, Mondal, A., Asmussen, K. E., Khoeini, S., Pendyala, R. M., & Bhat, C. R. (2022). Influence of Mode Use on Level of Satisfaction with Daily Travel Routine: A Focus on Automobile Driving in the United States. *Transportation Research Record*, 03611981221088199.
- Batur, I.**, Markolf S.A., Chester M.V., Middel A., Hondula D. & Vanos J. (2022). Street-Level Heat and Air Pollution Exposure Informed by Mobile Sensing. *Transportation Research Part D: Transport and Environment*, 113, 103535.

- Nair, G. S., Bhat, C. R., **Batur, I.**, Pendyala, R. M., & Lam, W. H. (2020). A Model of Deadheading Trips and Pick-Up Locations for Ride-Hailing Service Vehicles. *Transportation Research Part A: Policy and Practice*, 2020. 135:289-308.
- Batur, I.**, Bayram, I.S., and Koc, M. (2019). Impact Assessment of Supply-Side and Demand-Side Policies on Energy Consumption and CO<sub>2</sub> Emissions from Urban Passenger Transportation: The Case of Istanbul. *Journal of Cleaner Production*, 219:391-410.
- Batur, I.**, and Koç, M. (2017). Travel Demand Management (TDM) Case Study for Social Behavioral Change Towards Sustainable Urban Transportation in Istanbul. *Cities*, 69:20-35.

### Journal Articles (Under Review)

- Batur, I.**, Dirks, A. C., Mondal, A., Pendyala, R. M., & Bhat, C. R. Does Ridehailing Use Affect Vehicle Ownership or Vice Versa? An Exploratory Investigation of the Relationship Using a Latent Market Segmentation Approach. Submitted to *Transportation Research Record*, 2022.
- Batur, I.**, Dirks, A. C., Pendyala, R. M., Bhat, C. R., Polzin, S. E., & Chen, C. An Analysis of Changes in Time Use and Activity Participation in Response to the COVID-2019 Pandemic in the United States: Implications for Well-being. Submitted to *Transportation Research Record*, 2022.
- Dirks, A. C., **Batur, I.**, Mondal, A., Magassy, T. B., Haddad, A., Bhat, C. R & Pendyala, R. M. Access to Food in a Severe Prolonged Disruption: The Case of Grocery and Meal Shopping During the COVID-19 Pandemic. Submitted to *Travel Behavior and Society*, 2022.
- Magassy, T. B., **Batur, I.**, Mondal, A., Asmussen, K. E., Bhat, C. R., ... & Pendyala, R. M. Evolution of Mode Use Due to COVID-19 Pandemic in the United States: Implications for the Future of Transit. Submitted to *Transportation Research Record*, 2022.
- Magassy, T. B., **Batur, I.**, Mondal, A., Asmussen, K. E., Pendyala, R. M., & Bhat, C. R. A Multidimensional Analysis of Willingness to Share Rides in a Future of Autonomous Vehicles. Submitted to *Transportation Research Record*, 2022.
- Verma, V., Mondal, A., Asmussen, K. E., **Batur, I.**, Magassy, T. B., Bhat, C. R., & Pendyala, R. M. A Joint Behavioral Choice Model of Carpool Formation and Frequency. Submitted to *Transportation Research Record*, 2022.
- Asmussen, K. E., Mondal, A., **Batur, I.**, Dirks, A., Bhat, C. R., & Pendyala, R. M. An Investigation of Evolving COVID-Era Remote Work Arrangements. Submitted to *Transportation Research Part A: Policy and Practice*, 2022.
- Batur, I.**, K.E. Asmussen, A. Mondal, S. Khoeini, R.M. Pendyala, and C.R. Bhat. Assessing the Impact of Ridehailing Service Use on Bus Ridership: A Joint Modeling Framework Accounting for Endogeneity and Latent Attitudes. Submitted to *Travel Behavior and Society*, 2022.
- Sharda, S., S. Astroza, S. Khoeini, **I. Batur**, R.M. Pendyala, and C.R. Bhat. Do Attitudes Affect Behavioral Choices or Vice-Versa: Uncovering Latent Segments Within a Heterogeneous Population. Submitted to *Transportation Research Part A*, July 2020.
- Batur, I.**, S. Sharda, T. Kim, S. Khoeini, R.M. Pendyala, and C.R. Bhat. Mobility, Time Poverty, and Well-Being: How Are They Connected and How Much Does Mobility Matter?. Submitted to *Transportation Research Record*, 2020.
- Capasso da Silva, D., S. Astroza, **I. Batur**, S. Khoeini, T.B. Magassy, R.M. Pendyala, and C.R. Bhat. Are Millennials Really All That Different Than Generation X? An Analysis of Factors Contributing to Differences in Vehicle Miles of Travel. Submitted to *Transportation*, 2019.
- S. Sharda, T. Kim, S. Khoeini, **I. Batur**, and R.M. Pendyala. Development of an Integrated Model System of Transport and Residential Energy Consumption. Submitted to *Transportation Research Record*, 2019

### Conference Proceedings

- Garcia, C., Armoogum, J., **Batur, I.**, & Pendyala, R. (2022). Immobility and activity levels: a comparison of USA and France (No. hal-03683166).
- Sharda, S., T. Kim, S. Khoeini, **I. Batur**, D.C. Silva, and R.M. Pendyala (2019) Development of an Integrated Model System of Transport and Residential Energy Consumption. Proceedings of the 15th World Conference on Transport Research, World Conference on Transport Research Society, Leeds, UK.
- S. Sharda, S. Astroza, S. Khoeini, **I. Batur**, R.M. Pendyala, and C.R. Bhat (2019) Do Attitudes Affect Behavioral Choices or Vice Versa? Uncovering Latent Segments Within a Population. Proceedings of the 98th Annual Meeting of the Transportation Research Board, National Academies, Washington, D.C.
- Batur, I.**, I. S. Bayram, and M. Koc. The Role of Plug-in Electric Vehicles in Reducing Energy and CO<sub>2</sub> Emissions in Istanbul: A System Dynamics Approach. Presented at the IEEE 12th International Conference on Compatibility, Power Electronics and Power Engineering, Doha, Qatar, April 10-12, 2018.
- Batur, I.**, and M. Koc. A Review of System Dynamics Applications in Sustainable Urban Transportation. Presented at The European Conference on Sustainability, Energy and the Environment 2017, Brighton, UK, 7-9 July 2017.
- Batur, I.**, and M. Koc. Sustainable Urban Transportation with Travel Demand Management Methods: A Case Study for Istanbul. Paper presented at The Asian Conference on Sustainability, Energy and the Environment 2015, Kobe, Japan, 11-14 June 2015.
- Yildiz, U., **I. Batur**, S.A. Alumur, and H. Gultekin. A Bi-Criteria Machine Location Problem with Pick-up and Drop-off Points. Paper presented at the 20th European Working Group on Locational Analysis Meeting (EWGLA 2013), Ankara, Turkey, 17-19 April, 2013.

### Research Reports

- Khoeini, S., R. M. Pendyala, D. C. da Silva, **I. Batur**, T. Magassy, and S. Sharda (2020). TOMNET Transformative Transportation Technologies (T4) Survey Report (Full Deployment in Phoenix, AZ). ~109 p
- Pendyala, R. M., S. Sharda, **I. Batur**, and S. Khoeini (2020). Attitudes and Behaviors Causal Relationships: Uncovering Latent Segments Within A Heterogeneous Population. ~28 p
- Magassy, T., S. Sharda, T. Kim, D.C. da Silva, **I. Batur**, and R.M. Pendyala (2019) Population Synthesis for the Qatar Activity-based Travel Model: Final Results and User Documentation. Final Report Submitted to the University of California at Santa Barbara and ItalConsult, Santa Barbara, CA. ~200 p
- Batur, I.**, D.C. da Silva, S. Sharda, T. Kim, and R.M. Pendyala (2019) Estimation of CEMSELTS Model Components for the Qatar Activity-based Travel Model. Final Report Submitted to the University of California at Santa Barbara and ItalConsult, Santa Barbara, CA. ~40 p

## PRESENTATIONS

- Batur, I.**, Dirks, A. C., Mondal, A., Pendyala, R. M., & Bhat, C. R. *Does Ridehailing Use Affect Vehicle Ownership or Vice Versa? An Exploratory Investigation of the Relationship Using a Latent Market Segmentation Approach*. Presented at the 102<sup>nd</sup> Annual Meeting of the Transportation Research Board, Washington, DC, January 8-12, 2023.
- Batur, I.**, Dirks, A. C., Pendyala, R. M., Bhat, C. R., Polzin, S. E., & Chen, C. *An Analysis of Changes in Time Use and Activity Participation in Response to the COVID-2019 Pandemic in the United States: Implications for Well-being*. Presented at the 102<sup>nd</sup> Annual Meeting of the Transportation Research Board, Washington, DC, January 8-12, 2023.
- Dirks, A. C., **Batur, I.**, Mondal, A., Magassy, T. B., Haddad, A., Bhat, C. R & Pendyala, R. M. *Access to Food in a Severe Prolonged Disruption: The Case of Grocery and Meal Shopping During the COVID-19 Pandemic*. Presented at the 102<sup>nd</sup> Annual Meeting of the Transportation Research Board, Washington, DC, January 8-12, 2023.
- Magassy, T. B., **Batur, I.**, Mondal, A., Asmussen, K. E., Bhat, C. R., ... & Pendyala, R. M. *Evolution of Mode Use Due to COVID-19 Pandemic in the United States: Implications for the Future of Transit*. Presented at the 102<sup>nd</sup> Annual Meeting of the Transportation Research Board, Washington, DC, January 8-12, 2023.
- Magassy, T. B., **Batur, I.**, Mondal, A., Asmussen, K. E., Pendyala, R. M., & Bhat, C. R. *A Multidimensional Analysis of Willingness to Share Rides in a Future of Autonomous Vehicles*. Presented at the 102<sup>nd</sup> Annual Meeting of the Transportation Research Board, Washington, DC, January 8-12, 2023.
- Verma, V., Mondal, A., Asmussen, K. E., **Batur, I.**, Magassy, T. B., Bhat, C. R., & Pendyala, R. M. *A Joint Behavioral Choice Model of Carpool Formation and Frequency*. Presented at the 102<sup>nd</sup> Annual Meeting of the Transportation Research Board, Washington, DC, January 8-12, 2023.
- Asmussen, K. E., Mondal, A., **Batur, I.**, Dirks, A., Bhat, C. R., & Pendyala, R. M. *An Investigation of Evolving COVID-Era Remote Work Arrangements*. Presented at the 102<sup>nd</sup> Annual Meeting of the Transportation Research Board, Washington, DC, January 8-12, 2023.
- Batur, I.**, T.B. Magassy, A. Dirks, and R.M. Pendyala. *Future of Autonomous Vehicles: A Self-driving Revolution or Disaster?.* Presented at ITS World Congress 2022, Sep 21-25, 2022.
- Batur, I.**, A. Dirks, and R.M. Pendyala. *Changes in Time Use and Activity Participation During the COVID-2019 Pandemic in the US: Implications for Wellbeing and Time Poverty*. Presented at WCTRS 2022 Virtual Meeting, July 27, 2022.
- Batur, I.**, K.E. Asmussen, A. Mondal, S. Khoeini, R.M. Pendyala, and C.R. Bhat. *Sending Autonomous Vehicles to Pick-up, Deliver, and Run Errands: Sustainability Implications*. Presented at the Conference on Sustainability and Emerging Transportation Technology, Irvine, CA, May 31 – June 2, 2022.
- Magassy, T.B., S. Sharda, **I. Batur**, A. Dirks, S. Khoeini, and R.M. Pendyala. *How Does Adoption of Emerging Transportation Technologies Vary by Residential Preferences?.* Presented at the ASCE International Conference on Transportation & Development, Seattle, WA, May 31 – June 3, 2022.
- Sharda, S., T.B. Magassy, **I. Batur**, R.M. Pendyala, and V.M. Garikapati. *Differences in Utilization Patterns Between Electric and Gasoline Vehicles: Implications for Household Energy Consumption*. Presented at the ASCE International Conference on Transportation & Development, Seattle, WA, May 31 – June 3, 2022.
- Batur, I.**, K. E. Asmussen, A. Mondal, S. Khoeini, R. M. Pendyala, and C. R. Bhat. *Assessing the Impact of Ridehailing Service Use on Bus Ridership: A Joint Modeling Framework Accounting for Endogeneity and Latent Attitudes*. Presented at the 101st Annual Meeting of the Transportation Research Board, Washington, DC, January 9-13, 2022.
- Batur, I.**, K. E. Asmussen, A. Mondal, S. Khoeini, R. M. Pendyala, and C. R. Bhat. *Understanding Interest in Personal Ownership and Use of Autonomous Vehicles for Running Errands: An Exploration Using a Joint Model Incorporating Attitudinal Constructs*. Presented at the 101st Annual Meeting of the Transportation Research Board, Washington, DC, January 9-13, 2022.
- Magassy, T., **I. Batur**, A. Mondal, K. E. Asmussen, S. Khoeini, R. M. Pendyala, and C. R. Bhat. *The Influence of Mode Use on Level of Satisfaction with Daily Travel Routine: A Focus on Automobile Driving in the United States*. Presented at the 101st Annual Meeting of the Transportation Research Board, Washington, DC, January 9-13, 2022.
- Baker, D., T. Magassy,, S. Khoeini, P. Stopher, **I. Batur**, and R. M. Pendyala. *Autonomous Vehicles: The Role of Familiarity and Perceptions in Expected Adoption*. Presented at the 101st Annual Meeting of the Transportation Research Board, Washington, DC, January 9-13, 2022.
- Batur, I.**, D.C. da Silva, S. Khoeini, and R. M. Pendyala. *How Will Use of Autonomous Vehicles for Running Errands Affect Future Autonomous Vehicle Adoption and Ownership?.* Presented at the 18<sup>th</sup> IRF World Meeting & Exhibition, Dubai, Nov 7-10, 2021.
- Batur, I.**, S. Khoeini, and R. M. Pendyala. *Ridehailing Services Mode Substitution Patterns and Sustainability Implications: A Focus on Transit*. Presented at the How We Move Matters: Exploring the Connections Between New Transportation and Mobility Options and Environmental Health Virtual Workshop, July 13, 16, and 21, 2021.
- Batur, I.** *Sending Autonomous Vehicles for Pick-up, Delivery and Running Errands: An Attitudinal Based Analysis*. Presented at the Arizona Students Transportation Summit, April 30, 2021.
- Batur, I.**, S. Sharda, T. Kim, S. Khoeini, R. M. Pendyala, and C. R. Bhat. *Mobility, Time Poverty, and Well-Being: How Are They Connected and How Much Does Mobility Matter?.* Presented at the 99th Annual Meeting of the Transportation Research Board, Washington, DC, January 12-16, 2020.
- da Silva, D. C., S. Astroza, **I. Batur**, S. Khoeini, T. B. Magassy, R. M. Pendyala, and C. R. Bhat. *Are Millennials Really All That Different Than Generation X? An Analysis of Factors Contributing to Differences in Vehicle Miles of Travel*. Presented at the 99th Annual Meeting of the Transportation Research Board, Washington, DC, January 12-16, 2020.
- Sharda, S., T. Kim, S. Khoeini, **I. Batur**, and R. M. Pendyala. *Development of an Integrated Model System of Transport and Residential Energy Consumption*. Presented at the 99th Annual Meeting of the Transportation Research Board, Washington, DC, January 12-16, 2020.
- Garcia, C., J. Armoogum, and **I. Batur**. *Immobility and Activity Levels: A Comparison of the United States and France*. Presented at the 99th Annual Meeting of the Transportation Research Board, Washington, DC, January 12-16, 2020.

Sharda, S., T. Kim, S. Khoeini, **I. Batur**, D. C. da Silva, and R. M. Pendyala. *Development of an Integrated Model System of Transport and Residential Energy Consumption*. Presented at the 15<sup>th</sup> World Conference on Transport Research, World Conference on Transport Research Society, Indian Institute of Technology-Bombay, Mumbai, India, May 2019.

Sharda S., S. Astroza, S. Khoeini, **I. Batur**, R. M. Pendyala, and C. R. Bhat. *Do Attitudes Affect Behavioral Choices or Vice-Versa: Uncovering Latent Segments within a Population*. Presented at the 98th Annual Meeting of the Transportation Research Board, Washington, DC, January 13-17, 2019.

Sharda, S., **I. Batur**, S. Khoeini, T. Kim, and R. M. Pendyala. *An Integrated Model System of Household Transport and Residential Energy Consumption*. Presented at the 7th TRB Innovations in Travel Modeling Conference, Atlanta, GA, June 25, 2018.

**Batur, I.**, I. S. Bayram, and M. Koç. *The Role of Plug-in Electric Vehicles in Reducing Energy and CO<sub>2</sub> Emissions in Istanbul: A System Dynamics Approach*. Presented at the IEEE 12th International Conference on Compatibility, Power Electronics and Power Engineering, Doha, Qatar, April 10-12, 2018.

**Batur, I.**, and M. Koc. *A Review of System Dynamics Applications in Sustainable Urban Transportation*. Presented at The European Conference on Sustainability, Energy and the Environment 2017, Brighton, UK, 7-9 July 2017.

**Batur, I.**, and M. Koc. *Sustainable Urban Transportation with Travel Demand Management Methods: A Case Study for Istanbul*. Presented at The Asian Conference on Sustainability, Energy and the Environment 2015, Kobe, Japan, 11-14 June 2015.

Yıldız, U., **I. Batur**, S. A. Alumur, and H. Gultekin. *A Bi-Criteria Machine Location Problem with Pick-up and Drop-off Points*. Presented at the 20<sup>th</sup> European Working Group on Locational Analysis Meeting, Ankara, Turkey, 17-19 April, 2013.

## SKILLS (Technical)

Data analysis and modeling:	Phyton, R, SPSS, Gauss
Simulation:	PTV-Vissim, Vensim, Arena
Optimization:	GAMS, CPLEX
GIS:	Folium, ArcGIS
Other:	MATLAB, Git, CSS, JavaScript