Esra Suel

Personal Information

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Google Scholar ID: bit.ly/35zyZeO
Date of birth: 15.03.1984
Date of PhD defence: 06.04.2016

Education

PhD, Imperial College London, Transport Studies and Urban Systems, Civil and Environmental Engineering, UK (Supervisor: Prof. John Polak) **2011-2016**

MSE, University of Michigan Ann Arbor, Mechanical Engineering, USA **2006-2008**

BSc, Sabanci University, Mechatronics Major and Mathematics Minor, Turkey **2002-2006**

Academic Employment

University College London, The Bartlett Centre for Advanced Spatial Analysis, London, UK

Lecturer in City Modelling **June 2022 - Present**

ETH Zurich, Zurich, Switzerland

Senior Assistant, Chair of Geoinformation Engineering **October 2021 - Present**
Senior Data Scientist, Swiss Data Science Center **August 2018 - October 2021**
Postdoc Chair of Information Architecture **June 2017 - May 2018**

Imperial College London, School of Public Health, London UK

Health Data Research (HDR) Fellow **February 2018 - April 2022**
Academic Fellow, Data Science Institute **July 2018 - April 2022**

Harvard T.H. Chan School of Public Health, Dept. of Environmental Health, Boston, USA

Visiting Scientist **March 2019 - May 2019**

Imperial College London, Urban Systems Lab - Centre for Transport Studies, London UK

Research Assistant and Associate **March 2011 - February 2018**

University of Michigan, Environmental and Sustainable Technologies Lab, Ann Arbor, USA

Research and Teaching Assistant **August 2006 - December 2008**

Carnegie Mellon University, Robotics Institute, Pittsburgh, USA

Visiting Scholar **June 2005 - September 2005**

Funded Projects

Swiss Data Science Center, Switzerland (co-PI, January 2022) *DeepInAfrica: Deep statistical learning based image analysis for measurement of socioeconomic development in Sub-Saharan Africa*, Collaborative Data Science Projects, Funded Value: CHF521,540

National Institutes of Health (NIH), USA (co-PI, June 2020) *Built Environment Assessment through Computer Vision: Applying Deep Learning to Street-Level and Satellite Images to Estimate Built Environment Effects on Cardiovascular Health*, PI: Peter James, Funded Value: $863,771

Medical Research Council (MRC), UK (PI, February 2018) *Application of deep learning to heterogeneous open data for measuring urban environment and health*, Health Data Research (HDR) UK Fellowship, Funded Value: £331,573

Supervision

2022, Master's Semester Project, Sven Ruf, ETH Zurich
2018 - Present, Assistant PhD Supervisor, Beth Solomon, Imperial College London
2019, Master's Dissertation, Barbara Metzler, Imperial College London
2018, Undergraduate Research Project, Marthe Boulleau, Imperial College London

2018, Master's Dissertation, Julien Droin, Imperial College London
2018, Master's Dissertation, Yujia Liu, Imperial College London

Teaching

Instructor, Project Work GIS and Cartography, ETH Zurich, 2022
Instructor, GIS III, ETH Zurich, 2021
Module Lecturer, Population Health Analytics, Imperial College London, 2021
Module Lecturer, Urban Sustainable Environments, Imperial College London, 2021
Guest Lecturer, Workshop on Machine Learning Methods in Environment and Health Research, Imperial College London, 2020
Graduate Teaching Assistant, Transport Demand and Economics, Imperial College London, 2014
Graduate Teaching Assistant, Transport Demand and its Modelling, Imperial College London, 2014
Graduate Student Instructor, Senior Mechanical Design, University of Michigan, 2008
Graduate Student Instructor, Intro. to Computers and Programming, University of Michigan, 2007
Lab Assistant, Introduction to Science of Nature, Sabanci University, 2005

Prizes, Honors, Awards

Medical Research Council (MRC) UKRI Innovation/Rutherford Fund Fellowship Award, 2018
Rees Jeffreys Road Fund Bursary Award, Transportation Demand Modelling, 2013
Graduate Fellow, Graham Environmental Sustainability Institute, 2008
Graduate Research Fellow, The Scientific & Technological Research Council of Turkey, 2006
Merit scholarships, Sabanci University, 2002 - 2006

Memberships in panels and individual scientific reviewing activities

Co-Organizer, NeurIPS 2021 MLPH Workshop: Machine Learning in Public Health
Co-Chair, Big Data Working Group, Pathways to Equitable Healthy Cities Project
Member, Housing and Neighborhoods Working Group, Pathways to Equitable Healthy Cities Project
Member, International Association for Travel Behaviour Research (IATBR)
Committee Member and Friend, Transport Research Board (TRB)
Member, International Society for Environmental Epidemiology (ISEE)
Member, Transport and Health Science Group (THSG)

External reviewer for Journals and Peer-reviewed International Conferences: Transport Reviews, Journal of Transport and Health, Transportation Research Part A: Policy and Practice, Journal of Retailing and Consumer Services, Remote Sensing, Transactions on Mobile Computing, Transportation Research Record, Transportation Research Board Annual Meeting

Invited Talks

Roundtable Chair, the Conference on Health, Inference, and Learning (CHIL) 2022, April 2022
University of Oxford, Kellogg Global Centre on Healthcare and Urbanisation, March 2022
University College London (UCL), Centre for Advanced Spatial Analysis (CASA), February 2022
Planet Users Conference, October 2021
Planet Colloquium, July 2021
University of Oxford, Department of Social Policy and Intervention, June 2021
Canadian Urban Environmental Health Research Consortium (CANUE), May 2021
Imperial College London, Earth Observation Network, May 2021
Salzburg Global Seminar, June 2019
NASA AMES Research Center, May 2019
World Bank, Transforming Transportation, January 2014

Career Breaks

Maternity leave, July 2019 - February 2020

Non-Academic Employment

Self Employed Consultant, London, UK **2010 - 2018**

Research and consultancy projects for the World Bank, International Finance Cooperation (IFC), World Resource Institute (WRI), Istanbul Stock Exchange, British Council, United Nations, Corporate Governance Forum in Turkey.

Carbon Disclosure Project, London, UK, *Project Manager* **2010 - 2012**

World Resources Institute, Istanbul, Turkey, *Project Assistant* **2009 - 2010**

PE International Sustainability Consulting, Istanbul, Turkey, *Project Assistant* **2009**

PUBLICATIONS

Journal publications:

Suel, E., Sorek-Hamer, M., Moize, I., von Pohle, M., Sahasrabhojanee, A., Asanjian, A.A, Arku, R., Benjamin, B., Middel, A., Deardorff, E., Lingenfelter, V., Oza, N., Ezzati, M., Brauer, M., 2022., *What you see is what you breathe? Estimating air pollution spatial variation using street-level imagery.* Remote Sensing, 14(14), 3429.

Pescador Jimenez, M., **Suel, E.**, Rifas-Shiman, S.L., Hydstad, P., Larkin, A., Hankey, S., Just, Allan C., Redline, S., Oken, E., James, P., 2022. *Street-View Greenspace Exposure and Objective Sleep Characteristics.* Environmental Research, 214, 113744.

Sorek-Hamer, M., von Pohle, M., Sarasrabhojanee, A., Asanjan, A.A., **Suel, E.**, Deardorff, E., Lingenfelter, V., Oza, N., Ezzati, M., Brauer, M., 2022. *A Deep Learning Approach for Meter-Scale Air Quality Estimation in Urban Environments Using Very High-Spatial-Resolution Satellite Imagery.* Atmosphere, 13(5), 696.

Suel, E., Bhatt, S., Flaxman, S., Brauer, M., Ezzati, M., 2021. *Multimodal deep learning from satellite and street-level imagery for measuring income, overcrowding, and environmental deprivation in urban areas.* Remote Sensing of Environment 257, 112339.

Suel, E., Polak, J.W., Bennett J.E., Ezzati, M., 2019. *Measuring social, environmental and health inequalities using deep learning and street imagery.* Scientific reports 9, 6229.

Yazdi, M.D, Kuang, Z., Dimakopoulou K., Barratt, B., **Suel, E.**, Amini H., Lyapustin. A., Coull, B., Katsouyani, K., Schwartz, J., 2020. *Predicting Fine Particulate Matter (PM2.5) in the Greater London Area: An Ensemble Approach using Machine Learning Methods*, Remote Sensing 12.6:914.

Suel, E., Polak, J.W., 2018. *Incorporating online shopping into travel demand modelling: challenges, progress, and opportunities.* Transport Reviews, 1-26.

Suel, E., Polak, J.W., 2018, *Development of joint models for channel, store, and travel mode choice: grocery shopping in London.*, Transportation Research Part A: Policy and Practice, 99, pp.147-162.

Suel, E., Daina, N., Polak, J.W., 2018. *A hazard-based approach to modelling effects of online shopping on intershopping duration.*, Transportation, pp. 1-14

Suel, E., Le Vine S., Polak J.W., 2015, *Empirical Application of Expenditure Diary Instrument to Quantify Relationships Between In-Store and Online Grocery Shopping Case Study of Greater London.*, Transportation Research Record, ISSN:0361-1981, pp:45-54

Submitted manuscripts:

Suel, E., Muller, E., Bennett, J.E., Blakely, T., Lynch, J., Mackenback, J., Midden, A., Mizdrak, A., Nathwani, R., Wagtendonk, A., Brauer, M., Ezzati, M., 2021., *Do poverty and wealth look the same the world over? A comparative study of 12 cities from five high-income countries.* Under Review.

Nathvani, R., Clark, S.N., Muller, E., Alli, A.S., Bennett, J.E., Nimo, J., Moses, J.B., Solomon, B., Metzler, A.B., Brauer, M., **Suel, E.**, Huges, A., Rashid, T., Gemmel, E., Moulds, S., Baumgartner, J., Toledano, M., Agyemang, E., Owusul, G., Agyei-Mensah, S., Arku, R.E., Ezzati, M., 2021. *Spatiotemporal characterisation of urban environment and activity in Accra with imagery and deep learning.* Under review.

Li, Y., Zhang, Y., **Suel, E.**, Long, Y., Robinson, B.E., Cavanaugh, A.C., Ezzati, M., 2022. *Measuring Beijing Neighborhoods Socioeconomic Status from Sky and Street.* Under Review.

Bennett, J., Rashid, T., Zolfaghari, A., Doyle, Y., **Suel, E.**, Pearson-Stuttard, J., Davies, B., Fecht, D., Muller, E., Nathvani, R., Daby, H.I., Johnson, E., Li, G., Flaxman, S., Asaria, M., Ezzati, M. *High-resolution analysis of death registration and real estate data reveals the interlinked dynamics of*

house prices and life expectancy in London. Under Review.

Conference proceedings:

Casacuberta, S., **Suel, E.**, Flaxman, S. 2021. *PCACE: A Statistical Approach to Ranking Neurons for CNN Interpretability.* Responsible AI and DeepSpatial workshops at KDD 2021, Virtual, 14-18 August 2021.

Tasioulis, T., Bhalla, K., **Suel, E.**, Nathvani, R., Ezzati, M. 2021. *Walking safety: Measuring objective safety in the greater London area.* 17th International Conference on Urban Health, Virtual, 6-8 July 2021.

James, P., **Suel, E.**, Rifas-Shiman S. L., Hystad, P., Larkin, A., Hankey, S., Just, A. C., Hivert, M. F., Oken, E., Jimenez M. P., 2021. *Street-View Greenspace Exposure and Objective Daily Rest-Activity Patterns.*, 33rd Annual Conference of the International Society for Environmental Epidemiology (ISEE 2021), New York, USA. August 2021.

Jimenez M. P., **Suel, E.**, Rifas-Shiman S. L., Hystad, P., Larkin, A., Hankey, S., Just, A. C., Oken, E., James, P., 2021. *Street-View Greenspace Exposure and Objective Sleep Characteristics.*, 33rd Annual Conference of the International Society for Environmental Epidemiology (ISEE 2021), New York, USA. August 2021.

Suel, E., Sorek-Hamer, M., Moise, I., von Pohle, M., Sahasrabhojanee, A., Asanjan, A., Deardorff, E., Lingenfelter, V., Oza, N, Ezzati, M., Brauer, M., 2020. *Predicting air pollution spatial variation with street-level imagery.*, Machine Learning in Public Health (MLPH) Workshop, 34th Conference on Neural Information Processing Systems (NeurIPS 2020), Virtual. December 2020.

Suel, E., Sorek-Hamer, M., Moise, I., von Pohle, M., Sahasrabhojanee, A., Asanjan, A., Deardorff, E., Lingenfelter, V., Oza, N, Ezzati, M., Brauer, M., 2020. *Predicting air pollution spatial variation with street-level imagery.*, Machine Learning in Public Health (MLPH) Workshop, 34th Conference on Neural Information Processing Systems (NeurIPS 2020), Virtual. December 2020.

von Pohle, M., Sahasrabhojanee, A., Akbari Asanjan, A., Deardorff, E., Lingenfelter, V., Sorek-Hamer, M., **Suel, E.**, Matthews, B., Oza, N. and Brauer, M., 2020, December. *Air Quality Modeling for Urban Environments Using Deep Neural Networks and Very High-Resolution Satellite Imagery.* In AGU Fall Meeting. 2020.

Suel, E., Boulleau, M., Ezzati, M., Flaxman S., 2018. *Combining street imagery and spatial information for measuring socioeconomic status.*, Workshop on Modeling and Decision-Making in the Spatiotemporal Domain, 32nd Conference on Neural Information Processing Systems (NeurIPS 2018), Montréal, Canada. December 2018.

Martin, H., Bucher, D., **Suel, E.**, Zhao, P., Perez-Cruz, F., Raubal, M., 2018. *Graph Convolutional Neural Networks for Human Activity Purpose Imputation from GPS-based Trajectory Data.*, Workshop on Modeling and Decision-Making in the Spatiotemporal Domain, 32nd Conference on Neural Information Processing Systems (NeurIPS 2018), Montréal, Canada. December 2018.

Suel, E., Polak, J.W. 2017. *Non-parametric permutation tests for hypothesis testing in discrete choice models* 5th International Choice Modelling Conference, Cape Town, South Africa. April 2017.

Daina, N., **Suel, E.**, Latinopoulos, C., Polak, J., *Challenges in online updating of individual choice models for recommender systems or autonomous decision agents* 5th International Choice Modelling Conference, Cape Town, South Africa. April 2017.

Suel, E., Polak, J.W. 2016. *Identification of parameters in nested logit models with limited data: A Monte Carlo simulation study.* 5th hEART symposium of European Association for Research in Transportation. Delft University of Technology, Netherlands. September 2016.

Tolouei, R., **Suel, E.**, Triampela, M., Le Vine, S., Polak, J.W., Hanson, P., Kucharski, P. 2016. *Longitudinal analysis of trip rates in Britain: partial effects of migration, technology, and housing*

costs. 44th European Transport Conference, Barcelona, Spain. October 2016.

Suel, E., Zolfaghari, A., Polak, J. 2016. *A joint model of channel and store choice: grocery shopping in London.* 95th Annual meeting of the Transportation Research Board, Washington DC, USA. January 2016.

Suel, E., Tolouei, R., Le Vine, S., Hanson, P., Feeney, A., Polak, J. 2016. *Quantifying the effects of residential property markets and international migration on trip rates in Britain.* 95th Annual meeting of the Transportation Research Board, Washington DC, USA. January 2016.

Suel, E., Daina, N., Polak, J. 2016. *A hazard-based approach to modelling effects of online shopping on intershopping duration.* 48th Annual Universities Transport Study Group Conference, University of Bristol, UK. January 2016.

Suel, E., Zolfaghari, A., Polak, J. 2015. *Mobility behaviour in multi-channel retail environments: joint model of shopping channel, destination, and mode choice.* 4th hEART symposium of European Association for Research in Transportation, Technical University of Denmark Copenhagen, Denmark. September 2015.

Suel, E., Le Vine S, Polak J, 2015. *Empirical Application of Expenditure Diary Instrument to Quantify Relationships Between In-Store and Online Grocery Shopping Case Study of Greater London.*, 94th Annual meeting of the Transportation Research Board, Washington DC, USA. January 2015.

Suel, E., Zolfaghari, A., Polak, J. 2015. *Mobility impacts of multi-channel retailing: joint model of shopping channel and destination choice.* 47th Annual Universities Transport Study Group Conference, City University London, UK. January 2015.

Chen, Q., Le Vine, S., **Suel, E.**, Polak, J. 2015. *A panel-data analysis of the observed decline in car access among young adults in Britain.* 47th Annual Universities Transport Study Group Conference, City University London, UK. January 2015.

Databases

Suel, E., Pescador Jimenez, M., James, P. (2020). CRESSH Built Environment Deep Learning Algorithms for Massachusetts Study [data file]. Available from: https://sites.sph.harvard.edu/cressh/

Outreach activities

Media Coverage

M. Purdy, *Unlocking AI's Potential for Social Good,* Harvard Business Review, October 2020.

M. Bridge and D. Bugler, *AI locates deprived areas using Street View,* The Times, April 2019.

D. Lu, *AI that spots inequality could monitor living conditions in cities,* New Scientist, April 2019.

T. Collins and J. Pinkstone, *Google Maps street view images can be used to detect signs of social, economic, environmental and health inequality in major UK cities,* Daily Mail, April 2019

I. Aron and G. Goslin, *19 ways AI is changing London,* Time Out, London, May 2019.

Suel, E., *AI and Google street view images help monitor living conditions in cities.* Pathways To Equitable Health Cities Blog, London, June 2019.

Non-peer-reviewed publications

Polak, J., Keirstead, J., **Suel, E.** 2014. *Connecting Research with Cities: Mapping the UK's research landscape on urban systems and technologies.* Future Cities Catapult, London.

Ararat, M., **Suel, E.**, Yurtoglu, B., Sustainable Investment in Turkey: The Case in Context - An Update (May 2014). Available at SSRN: https://ssrn.com/abstract=2447937

Ararat, M., **Suel, E.**, The State of Sustainable Investment in Key Emerging Markets (May 11, 2011). Available at SSRN: https://ssrn.com/abstract=1989869

Ararat, M., Yurtoglu, B., **Suel, E.** and Tura, D., Sustainable Investment in Turkey 2010 (January 2011). Available at SSRN: https://ssrn.com/abstract=1989866