

GREGORY S. MACFARLANE

Brigham Young University
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430 Engineering Building
Provo, UT 84602

EDUCATION

GEORGIA INSTITUTE OF TECHNOLOGY

Ph.D., Transportation Systems Engineering May 2014
M.S., Economics May 2014

BRIGHAM YOUNG UNIVERSITY

B.S. with University Honors, Civil Engineering
Minor degrees in Mathematics and Asian Studies

December 2009

ACADEMIC EXPERIENCE

BRIGHAM YOUNG UNIVERSITY

Assistant Professor November 2018 —

UNIVERSITY OF NORTH CAROLINA, CHAPEL HILL

Adjunct Lecturer/Teaching Assistant January 2017 — May 2017

GEORGIA INSTITUTE OF TECHNOLOGY

Post-doctoral Researcher January 2014 — May 2014

RESEARCH INTERESTS

Transportation planning and engineering, travel demand modeling, passive transportation data, spatial and social correlation.

PROFESSIONAL EXPERIENCE

Registered professional engineer in North Carolina, license #044518

TRANSPORT FOUNDRY Atlanta, Georgia

Transportation Engineer April 2017 — October 2018
Developed a data-driven travel demand model from passive data sources.

WSP — PARSONS BRINCKERHOFF Raleigh, North Carolina

Technical Principal, Systems Analysis Group June 2014 — April 2017
Developed advanced travel demand models for public sector clients.

UTAH TRANSIT AUTHORITY Salt Lake City, Utah

Strategic Planning Intern May 2009 — June 2010
Developed transit operating scenarios for the Wasatch Front long-range transportation plan and for UTA's internal scenario planning and programming purposes.

HALES ENGINEERING Lehi, Utah

Engineering Intern July 2008 — May 2009
Prepared traffic impact analyses for commercial and residential developments.

First author or first faculty author on 10 of 23 total journal articles. [†]indicates BYU graduate student authors, *indicates BYU undergraduate authors.

- 23 Erhardt, G.D., Guan, H.Z. Lee, D., **Macfarlane, G.S.**, Van Hentenryck, P. (2024). Comprehensive studies on on-demand multimodal transit systems with two case studies in San Francisco and Salt Lake City. Working paper.
- 22 Tenenboim, E., Xu, Y., Erhardt, G.D., **Macfarlane, G.S.**, & Peeta, S. (2024). A model of ride-hailing driver participation: shift duration, start time, and start location. Working paper.
- 21 Day, C.[†], **Macfarlane, G.S.**, Atchley, S.H. *, Erhardt, G.D., Ven Hentenryck, P., Watkins, K.E. (2024). Implementation and quantitative evaluation of multi-modal optimization and simulation for transit and ridehail competitive analysis. Working paper.
- 20 **Macfarlane, G.S.** & Gray, N.M.[†] (2024). Evaluating the impacts of parameter uncertainty in a practical transportation demand model. Working paper.
- 19 Sivakumar, A., Jones, P. Möckel, R., Moreno Chou, A.T., Erhardt, G., **Macfarlane, G.S.**.. (2024). The ‘activity-based’ approach: a new perspective for addressing the major environmental and resource challenges faced by societies. Under review at *Proceedings of the National Academy of Science*.
- 18 **Macfarlane, G.S.**, Barnes, M.[†], & Gray, N.M.* (2024). A utility-based approach to modeling systemic resilience of highway networks with an application in Utah. *Journal of Transportation Engineering Part A: Systems*, forthcoming.
- 17 Wang, B.[†], Fulda, N., Huang, Z.Y.*, Schultz, G.G., **Macfarlane, G.S.**, Arnesen, J.*, Khayyat, A.* (2024). Predicting directional traffic volume at intersections with automated traffic signal performance measures data using machine learning algorithms. *Transportation Research Record*. <https://doi.org/10.1177/03611981241252829>
- 16 **Macfarlane, G.S.**, Riches, G.[†], Youngs, E.K.[†], Nielsen, J.A. (2024). Classifying location points as daily activities using simultaneously optimized DBSCAN-TE parameters. *Findings*. <https://doi.org/10.32866/001c.116197>
- 15 Turley Voulgaris, C., **Macfarlane, G.S.**, Kaylor, J. (2024). Whose emissions are these anyway? Estimating vehicle miles traveled to account for site-level climate impacts. *Journal of the American Planning Association*. <https://doi.org/10.1080/01944363.2023.2298962>
- 14 Wang, B.[†], Schultz, G.G., **Macfarlane, G.S.**, Eggett, D.L., & Davis, M.C.* (2023) A methodology to detect traffic data anomalies in automated traffic signal performance measures. *Future Transportation*. 3(4), 1175-1194. <https://doi.org/10.3390/futuretransp3040064>
- 13 Daines, T.J.[†], Schultz, G.G., **Macfarlane, G.S.**, & Ward, C.* (2022). Evaluating real time ramp meter queue length estimation. *Future Transportation*, 2(4), 807-827. <https://doi.org/10.3390/futuretransp2040045>
- 12 **Macfarlane, G.S.**, Stucki, E.[†], Redelfs, A.H., & Spruance, L.A. (2022). Beyond proximity: utility-based access from location-based services data. *International Journal of Environmental Research and Public Health*, 19(19), 12352. <https://doi.org/10.3390/ijerph191912352>.
- 11 **Macfarlane, G.S.**, Turley Voulgaris, C., & Tapia, T. (2022). City parks and slow streets: a utility-based access and equity analysis. *Journal of Transport and Land Use*. 15(1): 587-612. <https://doi.org/10.5198/jtlu.2022.2009>

- 10 Wang, B.[†], Schultz, G.G., **Macfarlane, G.S.**, & McCuen, S.* (2022). Evaluating signal systems using automated traffic signal performance measures. *Future Transportation*. 2(3): 659-674. <https://doi.org/10.3390/futuretransp2030036>.
- 9 **Macfarlane, G.S.**, Sheffield, M.H.[†], Bennet, L.S.[†], & Schultz, G.G. (2021). The effect of transit signal priority on bus rapid transit headway adherence. *Findings*, June. <https://doi.org/10.32866/001c.24499>.
- 8 **Macfarlane, G.S.**, Hunter, C.*, Martinez, A.*, & Smith, E.* (2021). Rider perceptions of an on-demand microtransit service in Salt Lake County, Utah. *Smart Cities* 4(2): 717-727. <https://doi.org/10.3390/smartcities4020036>
- 7 **Macfarlane, G.S.**, Boyd, N., Taylor, J.E., & Watkins, K. (2021) Modeling the impacts of park access on health outcomes: A utility-based accessibility approach. *Environment and Planning B: Urban Analytics and City Science*, 48(8), 2289–2306. <https://doi.org/10.1177/2399808320974027>
- 6 Glenn, J., Bluth, M.*, Christianson, M.*, Pressley, J.*, Taylor, A., **Macfarlane, G.S.**, & Chaney, R. A. (2020). Considering the potential health impacts of electric scooters: an analysis of user reported behaviors in Provo, Utah. *International Journal of Environmental Research and Public Health*, 17(17), 6344. <https://doi.org/10.3390/ijerph17176344>
- 5 **Macfarlane, G.S.**, Garrow, L.A., & Moreno-Cruz, J. (2015). Do Atlanta residents value MARTA? Selecting an autoregressive model to recover willingness to pay. *Transportation Research Part A: Policy and Practice*, 78, 214–230. <https://doi.org/10.1016/j.tra.2015.05.010>
- 4 **Macfarlane, G.S.**, Garrow, L.A., & Mokhtarian, P. L. (2015). The influences of past and present residential locations on vehicle ownership decisions. *Transportation Research Part A: Policy and Practice*, 74, 186–200. <https://doi.org/10.1016/j.tra.2015.01.005>
- 3 Brakewood, C., **Macfarlane, G.S.**, & Watkins, K.E. (2015). The impact of real-time information on bus ridership in New York City. *Transportation Research Part C: Emerging Technologies*, 53, 59–75. <https://doi.org/10.1016/j.trc.2015.01.021>
- 2 Binder, S., **Macfarlane, G.S.**, Garrow, L.A., & Bierlaire, M. (2014). Associations among household characteristics, vehicle characteristics and emissions failures: An application of targeted marketing data. *Transportation Research Part A: Policy and Practice*, 59, 122–133. <https://doi.org/10.1016/j.tra.2013.11.005>
- 1 Wall, T.A., **Macfarlane, G.S.**, & Watkins, K.E. (2014). Exploring the use of egocentric online social network data to characterize individual air travel behavior. *Transportation Research Record*, 2400, 78–86. <https://doi.org/10.3141/2400-09>
- 0 McBride, J.H., Keach, R. W., Macfarlane, R.T., De Simone, G.F., Scarpati, C., Johnson, D.J., **Macfarlane, G.S.**, & Weight, R.W.R. (2009). Subsurface visualization using ground-penetrating radar for archaeological site preparation on the northern slope of Somma-Vesuvius: a Roman site, Pollena-Trocchia, Italy. *Il Quaternario, Italian Journal of Quaternary Sciences*, 22(1), 39–52. <https://portal.issn.org/resource/ISSN/0394-3356>

- 13 **Macfarlane, G.S.**, Stucki, E.[†], Salmon, M.^{*}, Redelfs, A.H., Spruance, L.A. (2024). Where's dinner coming from? A utility-based investigation of access to nutrition in Utah. In *World Symposium of Transport and Land Use Research*. Bogotá, Colombia.
- 12 Turley Voulgaris, C., Jensen, A.F., **Macfarlane, G.S.** (2024). Children's mode choice and independence for the journey to school. In *17th International Conference on Travel Behavior Research*. Vienna, Austria.
- 11 Jarvis, D.L.[†], **Macfarlane, G.S.**, Woolley, B.^{*}, Schultz, G.G. (2024). Simulating incident management team response and performance. *Procedia Computer Science*. 238, pp. 91-96. <https://doi.org/10.1016/j.procs.2024.06.002>
- 10 Apelu, D.^{*}, **Macfarlane, G.S.**, Guthrie, W.S., Adams, N.^{*}, Mazzeo, B. (2023). Measuring Pavement Smoothness From the Perspective of E-Scooters. In *2023 Intermountain Engineering, Technology, and Computing Conference (i-ETC)*. IEEE XPlore, <https://doi.org/10.1109/IETC57902.2023.10152077>
- 9 **Macfarlane, G.S.**, Lant, N.[†] (2023). How Far Are We From Transportation Equity? Measuring the Effect of Wheelchair Use on Daily Activity Patterns. In: Antoniou, C., Busch, F., Rau, A., Hariharan, M. (eds) *Proceedings of the 12th International Scientific Conference on Mobility and Transport. Lecture Notes in Mobility*. Springer, Singapore. https://doi.org/10.1007/978-981-19-8361-0_10
- 8 Turley Voulgaris, C., **Macfarlane, G.S.**, Kaylor, J., Su, T., Bauranov, A. (2022). Whose emissions are these anyway? Estimating vehicle miles traveled to account for site-level climate impacts. In *Transportation Research Board Annual Meeting*. Washington, D.C.
- 7 **Macfarlane, G.S.**, Stucki, E.[†], & Copley, M.^{*}. (2021). Utility-Based Accessibility to Community Resources: An Application of Location-Based Services Data. In *North American Regional Science Conference*. Denver, Colorado.
- 6 **Macfarlane, G.S.**, & Tapia, T. (2020). Developing a Park Activity Location Choice Model from Passive Origin-Destination Data Tables. In *Transportation Research Board Annual Meeting*. Washington, D.C.
- 5 **Macfarlane, G.S.**, & Moreno-Cruz, J. (2015). The Association Between Public Transportation Infrastructure and Home Price Growth and Stability. *North American Regional Science Conference*. Portland, Oregon.
- 4 Zhang, B., **Macfarlane, G.S.**, Wall, T.A., & Watkins, K.E. (2014). Friendship Influences on Air Travel: A Social Autoregressive Analysis. In *North American Regional Science Conference*. Washington, D.C.
- 3 **Macfarlane, G.S.**, Moreno-Cruz, J., & Garrow, L. A. (2013). Does Atlanta value MARTA? Selecting an autoregressive model to recover willingness-to-pay. In *North American Regional Science Conference*. Atlanta, Georgia.
- 2 **Macfarlane, G.S.**, Saito, M., & Schultz, G.G. (2011). Delay underestimation at free right-turn channelized intersections. In *6th International Symposium on Highway Capacity and Quality of Service* (Vol. 16, pp. 560–567). <https://doi.org/10.1016/j.sbspro.2011.04.476>
- 1 **Macfarlane, G.S.**, Saito, M., & Schultz, G.G. (2011). Driver perceptions at free right-turn channelized intersections. In *T&DI Congress 2011: Integrated Transportation and Development for a Better Tomorrow* (Vol. 398, pp. 108–108). ASCE. [https://doi.org/10.1061/41167\(398\)108](https://doi.org/10.1061/41167(398)108)

REPORTS

- 11 **Macfarlane, G.S.**, Jarvis, D.L.[†], Woolley, B.* , & Schutz, G.G. (2024). *Simulating Incident Management Team Response and Performance*. (No. UT-23.22). Utah Dept. of Transportation. Division of Research. <https://rosap.ntl.bts.gov/view/dot/74034>
- 10 Schultz, G.G., Hyer, J.[†], Holdsworth, H.* , Eggett, D.L., & **Macfarlane, G.S.** (2023). *Analysis of benefits of UDOT's expanded incident management team program*. (No. UT-23.05). Utah Dept. of Transportation. Division of Research. <https://doi.org/10.21949/1528563>
- 9 **Macfarlane, G.S.**, Atchley, S.H.[†] (2023). *Identifying Microtransit Service Areas through Microsimulation*. (No. UT-23.01). Utah Dept. of Transportation. Division of Research. <https://rosap.ntl.bts.gov/view/dot/66312>
- 8 Schultz, G.G. **Macfarlane, G.S.**, Wang, B.[†], & Davis, M.C.* (2022). *Detecting Traffic Data Anomalies in Longitudinal Signal Performance Measures*. (No. UT-22.21). Utah Dept. of Transportation. Division of Research. <https://rosap.ntl.bts.gov/view/dot/65833>
- 7 Schultz, G. G., **Macfarlane, G.S.**, Daines, T.J.[†], Ward, C.K.* , Umphress, J.* (2022). *Evaluating Ramp Meter Wait Time in Utah*. (No. UT-21.06). Utah Dept. of Transportation. Division of Research. <https://rosap.ntl.bts.gov/view/dot/61507>
- 6 **Macfarlane, G.S.**, Lant, N.J.[†], (2021). *Estimation and Simulation of Daily Activity Patterns for Individuals Using Wheelchairs* (No. UT-21.10). Utah Dept. of Transportation. Division of Research. https://rosap.ntl.bts.gov/view/dot/54639/dot_54639_DS1.pdf
- 5 Schultz, G. G., **Macfarlane, G.S.**, Wang, B.[†], & McCuen, S.* (2020). *Evaluating the Quality of Signal Operations Using Signal Performance Measures* (No. UT-20.08). Utah Dept. of Transportation. Division of Research. https://rosap.ntl.bts.gov/view/dot/54639/dot_54639_DS1.pdf
- 4 **Macfarlane, G.S.** & Copley, M.J.* (2020). *A Synthesis of Passive Third-Party Data sets used for Transportation Planning*. (No. UT-20.20). Utah Dept. of Transportation. Division of Research. https://rosap.ntl.bts.gov/view/dot/54890/dot_54890_DS1.pdf
- 3 Zalewski, A., Sonenklar, D., Cohen, A., Kressner, J., & **Macfarlane, G.S.** (2019). *Public Transit Rider Origin–Destination Survey Methods and Technologies*. TCRP Synthesis of Transit Practice 138. Transportation Research Board. <http://www.trb.org/Main/Blurbs/179008.aspx>
- 2 Miller, H., O'Kelly, M., Jaegal, Y., Bachman, W., Huntsinger, L., & **Macfarlane, G.S.** (2017). *Estimating External Travel Using Purchased Third-Party Data*. Research Report 134877, the Ohio Department of Transportation, Office of Statewide Planning & Research.
- 1 Cruz, J., **Macfarlane, G.S.**, Xu, Y., Rodgers, M.O., & Guensler, R. (2015). *Sustainable Transportation Curricula*. National Center for Sustainable Transportation. <https://escholarship.org/uc/item/3c13q43c>.

PRESENTATIONS

- 29 Jarvis, D.L.[†], **Macfarlane, G.S.**, Woolley, B.* , Schultz, G.G. (2024). Simulating incident management team response and performance. In *The 15th International Conference on Ambient Systems, Networks and Technologies (ANT)*. Hasselt, Belgium. Lectern presentation.
- 28 **Macfarlane, G.S.**, Barnes, M.[†], & Gray, N.M.* (2024). A utility-based approach to modeling systemic resilience of highway networks with an application in Utah. In *Transportation Research Board Annual Meeting*. Poster presentation. Washington, D.C.

- 27 Brown, N., **Macfarlane, G.S.**, Baird, T., & Gresham, C. (2023). Activity-based models: A clearer crystal ball? in *Utah Transportation Conference*. LECTERN presentation. Sandy, Utah.
- 26 **Macfarlane, G.S.** Modeling with Big Data. (2023) At *Technische Universität München*, invited lecture in Dr. Rolf Möckel’s travel modeling course.
- 25 Guan, H.Z., Van Hentenryck, P., Erhardt, G.D., **Macfarlane, G.S.**, & Watkins, K.E. (2023). Lessons from the design of on-demand multimodal transit systems in two cities. In *Innovations in Transportation Analysis and Planning Conference*. LECTERN presentation. Indianapolis, Indiana. *Winner, best presentation by a student author.*
- 24 Ducuara, A. Holtrop-Kohl, L., Begay, S., Spruance, L., Redelfs, A., **Macfarlane, G.S.** (2023). Hungry for change: how cutting-edge research is helping to reduce food deserts in Utah. In *Move Utah Summit*. Moderated panel discussion. Salt Lake City, Utah.
- 23 Singh, G., Young, S., **Macfarlane, G.S.**, Katsikides, N., Granato, S. (2023). Travel Data Users Forum: Innovative Usage of GPS Trajectory Data: Present and Future. In *Transportation Research Board Annual Meeting*. Invited panel discussion. Washington, D.C.
- 22 **Macfarlane, G.S.**, Barnes, M.[†], & Gray, N.[†]. (2022). Evaluating systemic resiliency in Utah. In *Utah Dept. of Transportation Annual Conference*. LECTERN presentation. Sandy, Utah.
- 21 **Macfarlane, G.S.**, Day, C.S.[†], & Atchley, S.H.[†]. (2022). Modeling novel transport modes. In *Utah Dept. of Transportation Annual Conference*. LECTERN presentation. Sandy, Utah.
- 20 Antoniou, C., Möckel, R., **Macfarlane, G.S.**, Kotsopoulous, H., Llorca-Garcia, C., Erhardt, G.D., Mahajan, V., Schmöcker, J.D., & Pereira, F. (2022). Transport Modeling using Publicly Available Data. Invited participants to a workshop hosted by Technische Universität München and the German Research Foundation.
- 19 **Macfarlane, G.S.**, & Lant, N.J.[†] (2022). How far are we from transportation equity? Measuring the effect of wheelchair use on daily activity patterns. In *mobil.TUM 2022 – 12th International Scientific Conference on Mobility and Transport*. LECTERN presentation. Singapore.
- 18 **Macfarlane, G.S.**, & Atchley, S.H.^{*}, Day, C.S.[†], Erhardt, G., & Needell, Z. (2022). Simulating and prioritizing service areas for regionally exclusive microtransit operations. In *mobil.TUM 2022 – 12th International Scientific Conference on Mobility and Transport*. LECTERN presentation. Singapore.
- 17 Anderson, S.^{*}, **Macfarlane, G.S.**, & Schultz, G.G. (2022). Developing a New Method to Analyze Speed and Braking Data Using V2X Technology. In *Utah Conference of Undergraduate Research*. Poster. St. George, Utah.
- 16 **Macfarlane, G.S.** (2022). Using Big Data to Evaluate Equitable Access to Community Resources. In *Transportation Research Board Annual Meeting*. Invited LECTERN presentation. Washington, D.C.
- 15 **Macfarlane, G.S.**, Stucki, E.[†], & Copley, M.^{*}. (2021). Utility-Based Accessibility to Community Resources: An Application of Location-Based Services Data. In *North American Regional Science Conference*. Denver, Colorado.
- 14 **Macfarlane, G.S.**, Lant, N.J.[†], (2021). Estimation and Simulation of Daily Activity Patterns for Individuals Using Wheelchairs. In *Utah Dept. of Transportation Annual Conference*. LECTERN presentation. Sandy, Utah.

- 13 **Macfarlane, G.S.** & Copley, M.J.* (2020). A Synthesis of Passive Third-Party Data sets used for Transportation Planning. In *Utah Dept. of Transportation Annual Conference*. Poster. Sandy, Utah.
- 12 Turley Voulgaris, C., **Macfarlane, G.S.**, Kaylor, J., Su, T., Bauranov, A. (2021). Whose emissions are these anyway? Estimating vehicle miles traveled to account for site-level climate impacts. In *Association of Collegiate Schools of Planning Annual Conference*. Lectern presentation. Miami, Florida.
- 11 **Macfarlane, G.S.**, Boyd, N., Taylor, J.E., & Watkins, K.E. (2019). Modeling the impacts of park access on health outcomes: a choice-based accessibility approach. In *Greater and Greener 2019*. Workshop presentation. Denver, Colorado.
- 10 Bernardin, V., Gallup, A., Lee, B., Johnson, C., **Macfarlane, G.S.**, Elgar, I., Wertman, R. (2019). How to be a Good Big Data Consumer. In *Transportation Planning Applications Conference*. Panel discussion. Portland, Oregon.
- 9 **Macfarlane, G.S.**, & Kressner, J.D. (2018). Comparing the Daily Schedules in the NHTS from 2009 and 2017. In *National Household Travel Survey (NHTS) Data for Transportation Applications Workshop*. Poster. Washington, D.C.
- 8 **Macfarlane, G.S.**, Bettinardi, A.O., & Donnelly, R. (2017). SWIMR: Visualizing complex longitudinal indicators for a statewide integrated land use and transport model in Oregon. In *Transportation Planning Applications Conference*. Lectern presentation. Raleigh, North Carolina.
- 7 Boyd, N., **Macfarlane, G.S.**, Watkins, K.E., & Ederer, D. (2017). Accessibility to urban parks and health outcomes on the neighborhood level. In *American Public Health Association Annual Meeting*. Poster. Atlanta, Georgia.
- 6 **Macfarlane, G.S.**, & Kressner, J.D. (2017). Modeling automated vehicles with a passive data model. In *Transportation Planning Applications Conference*. Poster. Raleigh, North Carolina.
- 5 Kressner, J.D., **Macfarlane, G.S.**, Donnelly, R., & Huntsinger, L.F. (2016). Using passive data to build an agile tour-based model: A case study in Asheville. In *Innovations in Travel Modeling Conference*. Lectern presentation. Denver, Colorado.
- 4 **Macfarlane, G.S.**, & Kressner, J. D. (2016). Fusing Passive Data for Transportation Planning. In *Transportation Research Board Annual Meeting*. Poster. Washington, D.C.
- 3 **Macfarlane, G.S.**, & Moreno-Cruz, J. (2015). The association between public transportation infrastructure and home price growth and stability. In *Transportation Research Board Annual Meeting*. Washington, D.C.
- 2 **Macfarlane, G.S.**, & Garrow, L. A. (2012). Estimating a vehicle ownership model from targeted marketing data. In *Travel Surveys: Moving from Tradition to Practical Innovation*. Poster. Dallas, Texas.
- 1 Kressner, J.D., & **Macfarlane, G.S.** (2012). Evaluating household credit reports as a replacement for episodic travel surveys. In *Transportation Research Board Annual Meeting*. Committee presentation. Washington, D.C.
- 0 **Macfarlane, G.S.**, Saito, M., & Schultz, G.G. (2011). Are free right-turn channelized intersections performing as they should? In *Institute of Transportation Engineers Annual Meeting and Exhibit 2011*.

EXTERNAL
FUNDING

As Principal Investigator, totalling \$375,000:

- 7 **Macfarlane, G.S.** & Brown, N.M. 2022. *Activity-based Model Implementation and Analysis Considerations*. \$70,000, Utah Department of Transportation.
- 6 **Macfarlane, G.S.** & Schultz, G.G. 2021. *Optimizing Traffic Incident Management Deployment in Utah*. \$70,000, Utah Department of Transportation.
- 5 **Macfarlane, G.S.**, Redelfs, A.H., & Spruance, L.A. 2021. *Equitable Access to Nutrition in Utah*. \$70,000, Utah Department of Transportation.
- 4 **Macfarlane, G.S.** 2020. *Identifying Microtransit Service Areas through Microsimulation*. \$20,000, Utah Department of Transportation
- 3 **Macfarlane, G.S.** 2019. *A synthesis of passive third-party datasets used for transportation planning*. \$25,000, Utah Department of Transportation
- 2 **Macfarlane, G.S.** 2019. *Modeling the demand and operating characteristics for wheelchair-accessible, on-demand mobility services*. \$60,000, Utah Department of Transportation
- 1 **Macfarlane, G.S.** 2019. *Evaluating the Systemic Redundancy of Critical Highway Facilities*. \$60,000, Utah Department of Transportation

As Co-Principal Investigator, totalling \$1.16 million (\$235,000 to BYU):

- 4 Schultz, G.G. & **Macfarlane, G.S.** 2021. *Analysis of performance measures of UDOT's traffic incident management program: Phase III*. \$30,000. Utah Department of Transportation.
- 3 Watkins, K.E. (PI), Hunter, M.S., Van Hentenryck, P., Peeta, S., Brakewood, C., Cherry, C., Erhardt, G.D., & **Macfarlane, G.S.** 2020. *T-SCORE: Transit Serving Communities Optimally, Responsibly, and Efficiently*. \$1,000,000, United States Department of Transportation.
- 2 Schultz, G.G. (PI), **Macfarlane, G.S.** 2020. *Evaluating Signal Performance Measures: a Longitudinal Analysis*. \$70,000, Utah Department of Transportation
- 1 Schultz, G.G. (PI), **Macfarlane, G.S.** 2019. *Evaluating ramp meter delay in Utah*. \$65,000, Utah Department of Transportation

INTERNAL
COMPETITIVE
FUNDING

Funded research:

- **Macfarlane, G.S.**, Guthrie, W.S., Mazzeo, B. 2021. *Measuring pavement smoothness from the perspective of e-scooters*. \$25,000, Mentored Research Grant, Brigham Young University.

Unfunded proposals:

- **Macfarlane, G.S.**, Hooley, C., Redelfs, A., South, M. 2020 *Using Mobile Device Data to Measure Isolation and Mental Health*. \$40,000, Brigham Young University Interdisciplinary Research Grant.

COURSES

CCE 201: SUSTAINABLE INFRASTRUCTURE

The inter-related aspects of the different civil engineering disciplines of environmental, geotechnical, structural, transportation, and water resources and how they come together to develop an infrastructure system. Time value of money and application to the infrastructure investment alternatives.

CE 361: INTRODUCTION TO TRANSPORTATION ENGINEERING

Transportation systems characteristics, traffic engineering and operations, transportation planning, geometric design, pavement design, transportation safety, freight, public transport, sustainable transportation.

CE 565: URBAN TRANSPORTATION PLANNING

Characteristics of urban transportation planning and decision making, intermodal transportation, land-use transportation interrelationships, transportation demand modeling, site impact analysis, sustainable transportation, and livable cities.

CE 594R: DATA SCIENCE FOR ENGINEERS

A first-semester graduate course in programming and data science techniques: literate programming in Markdown and LaTeX, version control with git, data manipulation and visualization with R, object-oriented programming with Java.

CE 662: TRANSPORT SIMULATION AND ANALYSIS

An advanced graduate course in traffic flow theory and simulation. Topics include shock wave analysis, discrete event simulation of queues and daily activity pattern choices, car following models, and traffic simulation. Laboratory assignments use MATSim and PTV Vissim simulation softwares.

CE 694R: ADVANCED CHOICE MODELING

An advanced graduate course in discrete choice modeling. Theory of choice models, including estimation and validation techniques. Mode choice models for work and non-work trip purposes using multinomial and nested logit models.

GRADUATE
MENTORING

Students mentored as graduate committee chair (9 total, 2 current):

- 9 Emily Youngs. *Exploring the Link between Travel Behavior and Mental Health*. MS granted August 2024.
- 8 Hayden Atchley. *A Comparative Illustration of Trip- and Activity-Based Modeling Techniques*. MS granted August 2024.
- 7 Daniel Jarvis. *Simulating Incident Management Team Response and Performance*. MS granted December 2023.
- 6 Natalie Gray, *Evaluating parameter uncertainty in transportation demand models*. MS granted June 2023.
- 5 Emma Stucki, *Evaluating equitable access to nutrition in Utah*. MS granted December 2022.
- 4 Gillian Riches, *Transforming GPS points to daily activities using simultaneously optimized DBSCAN-TE parameters*. MS granted December 2022.
- 3 Christopher Day, *Forecasting ride-hailing across multiple model frameworks*. MS granted December 2022.
- 2 Max Barnes, *Resiliency of Utah's road network: a logit-based approach*. MS granted December 2021.

- 1 Nate Lant, *Estimation and simulation of daily activity patterns for individuals using wheelchairs*. MS granted June 2021.

Students mentored as graduate committee member (21 total, 4 current, 3 non-BYU):

- 22 Sara Jaen Hosey, Ph.D. in Civil Engineering pre-proposal.
- 21 Samuel McKinnon, Ph.D. in Mechanical Engineering pre-proposal.
- 20 Ian MacGregor. MS scheduled December 2024.
- 19 Adam Hill. MS scheduled December 2024.
- 18 Sam Runyan. MS scheduled December 2024.
- 17 Joel Hyer, *Analysis of benefits of UDOT's expanded incident management team program*. MS granted April 2024.
- 16 Matthew Davis, *Effectiveness of Intelligent Transportation Systems on Utah Roadways*. MS granted December 2023.
- 15 William Charlton, *Web-based data visualization in support of agent-based microsimulation models*. Ph.D. granted October 2023 (at TU Berlin).
- 14 Wang Bangyu (Bruce), *Evaluating and advancing automated traffic signal performance measures: Statistical and machine learning approaches*. Ph.D. granted August 2023.
- 13 Tomas Barriga, *Using severity weighted risk scores to prioritize safety funding in Utah*. MS granted August 2023.
- 12 Benjamin Meek, *Load-deformation behavior of tension-only X-brace roof truss diaphragms*. MS granted April 2023.
- 11 Mylan Cook. *Physics-guided modeling of acoustic environments using limited spatio-spectro-temporal data*. Ph.D. in Physics granted June 2023.
- 10 Cory Ward, *An evaluation of the safe speed limit setting procedure and tool for Utah* (Project). MS granted December 2022.
- 9 Samantha Lau, *Analysis of using V2X DSRC equipped snowplows to request signal preemption*. MS granted August 2022.
- 8 Tanner Daines, *Evaluating ramp meter delay in Utah*. MS granted April 2022.
- 7 Logan Bennett, *Analysis of benefits of an expansion to UDOT's incident management program*. MS granted August 2021.
- 6 Camille Lunt, *Crash analysis methodology for segments of Utah highway*. MS granted April 2021.
- 5 Chad Vickery, *Quantifying the conditioning period for geogrid-reinforced aggregate base materials through cyclic loading*. MS granted August 2020.
- 4 Michael Sheffield, *Impacts of changing the transit signal priority requesting threshold on bus performance and general traffic: a sensitivity analysis*. MS granted June 2020.
- 3 Michael Adamson, *An analysis of decision boundaries for left-turn treatments*. MS granted April 2019.

- 2 Nico Boyd, *Accessibility to urban parks and health outcomes on the neighborhood level*. MS granted August 2018 (at Georgia Tech).
 - 1 Zhang Bingling, *Friendship influences on air travel: a social autoregressive analysis*. MS granted August 2014 (at Georgia Tech).
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UNDERGRADUATE
MENTORING

- Students mentored on funded research projects (25 total):
- 25 Kamryn Mansfield, undergraduate research assistant in demand microsimulation (2023 -).
 - 24 Harrison Holdsworth, undergraduate research assistant in demand microsimulation (2021 - 2022).
 - 23 Brynn Woolley, undergraduate research assistant in demand microsimulation (2022 -).
 - 22 Jeremy Raine, undergraduate research assistant in community resources (2022). Majoring in Psychology.
 - 21 Jonathan Orton, undergraduate research assistant in e-scooters and pavements (2022).
 - 20 Dylan Apelu, undergraduate research assistant in e-scooters and pavements (2021 - 2023). Now MS student at Georgia Institute of Technology.
 - 19 Hayden Atchley, undergraduate research assistant in demand microsimulation (2020 - 2022). Now MS student at BYU.
 - 18 Nicole Adams, undergraduate research assistant in e-scooters and pavements (2021 - 2022).
 - 17 Liv Neeley, undergraduate research assistant in e-scooters and pavements (2021 - 2022).
 - 16 Kaeli Monahan, undergraduate research assistant in community resources and passive data (2020 - 2022). Now BS student in Mechanical Engineering at BYU.
 - 15 Shannon Anderson, undergraduate research assistant in V2X data, jointly mentored with Grant Schultz (2020 - 2022). Now working in industry.
 - 14 Corey Ward, undergraduate research assistant in ramp meter evaluation, jointly mentored with Grant Schultz (2020 - 2021). Completed MS at BYU.
 - 13 Michael Copley, undergraduate research assistant in third-party passive data (2018 - 2021). Completed MS at University of Illinois.
 - 12 James Umphress, undergraduate research assistant in ramp meters (2020-2021), jointly mentored with Grant Schultz. Now MS student at Oregon State University.
 - 11 Christopher Day, undergraduate research assistant in demand microsimulation (2020 - 2021). Completed MS at BYU.
 - 10 Emma Stucki, undergraduate research assistant in community resources (2020 - 2021). Completed MS at BYU.
 - 9 Gillian Martin Riches, undergraduate research assistant in community resources (2020 - 2021). Completed MS at BYU.
 - 8 Natalie Gray, undergraduate research assistant in network resiliency (2019 - 2021). Completed MS at BYU.

- 7 Max Barnes, undergraduate research assistant in network resiliency (2019 - 2020). Completed MS at BYU.
- 6 Kim Munseok, undergraduate research assistant in demand microsimulation (2020 - 2021). Completed BS in Computer Science at BYU.
- 5 Christian Hunter, undergraduate research assistant in demand microsimulation (2018 - 2019). Completed MS at University of Texas at Austin.
- 4 Christian Vanderhoeven, undergraduate research assistant in demand microsimulation (2019). Completed MS at University of Washington.
- 3 Hayden Anderson, undergraduate research assistant in e-scooters (2019 - 2020). Completed MS at the University of California, Davis.
- 2 Emily Andrus, undergraduate research assistant in signal performance data, jointly mentored with Grant Schultz (2019).
- 1 Sabrina McCuen, undergraduate research assistant in signal performance data, jointly mentored with Grant Schultz (2019 - 2020).

Honors students mentored as department honors coordinator (3 total).

- 2 Becca Apgar, *Development and demonstration of an apparatus for assessing frost-heave susceptibility of soil* (2024).
- 1 Daria Sofia Velasco-Vega, *Thermal performance of thin-shell concrete dome structures* (2023).
- 0 Emma Kratz-Bailey, *Accessible methods, novel arrangement: Developing self-centering composite structural frames for highly resilient buildings* (2022).

Students mentored as civil engineering capstone team advisor (23 total):

- 2023-2024 BYU household travel survey. Sponsored by BYU Sustainability Office. Students: Megan Hungerford, Ellie Johns, Kamryn Mansfield, and Myrranda Salmon.
- 2022-2023 SR-140 Corridor alternatives. Sponsored by Bluffdale City. Students: Clinton Childers, Robert Mickelson, Trevor Mickelson, and Joseph Wells.
- 2021-2022 BYU household travel survey. Sponsored by BYU Sustainability Office. Students: Nicole Adams, Hayden Atchley, Kyle Leatham, and Daniel Jarvis.
- 2020-2021 Forecasting demand for future FrontRunner scenarios. Sponsored by Utah Transit Authority. Students: Gillian Martin Riches, Tomas Barriga, Landon Pratt, and Cole Larsen.
- 2019-2020 UTA microtransit pilot evaluation. Sponsored by Utah Transit Authority. Students: Christian Hunter, Austin Martinez, and Elizabeth Smith.
- 2018-2019 Demand for wheelchair-accessible vehicles. Sponsored by Utah Transit Authority. Students: Nate Lant, Byron Yates, Cody Irons, and Matthew Strong.

AWARDS AND HONORS

MOST INFLUENTIAL FACULTY Given to the faculty member in the Civil Engineering program whom graduating seniors name as the most influential on their undergraduate education. Awarded by 2022 graduating class.

TUM GLOBAL VISITING PROFESSOR Selected to enrich the vibrant research culture at the Technische Universität München by virtue of innovative approaches and to explore new, cutting-edge research fields. Awarded in 2023.

ASCE EXCEED TEACHING FELLOW Participated in week-long intensive teacher development program. Class of 2022.

DWIGHT DAVID EISENHOWER GRADUATE FELLOWSHIP Full doctoral funding from the Federal Highways Administration 2011-2013, one of five awards nationally. Awarded supplemental grant in 2013.

ENO CENTER FOR TRANSPORTATION LEADERSHIP DEVELOPMENT CONFERENCE Participated in the 2012 program; nominated by the Ivan Allen, Jr. College of Liberal Arts at Georgia Tech.

PARSONS BRINCKERHOFF - JIM LAMMIE ENGINEERING SCHOLARSHIP Awarded to the top engineer in the 2011 American Public Transportation Foundation (APTF) competition. Sponsored by Mike Allegra, general manager of the Utah Transit Authority. Renewed in 2012.

GORDON W. SCHULTZ GRADUATE FELLOWSHIP Given to the Georgia Tech student in travel demand modeling who exhibits innovation, problem-solving, and practical application.

NATIONAL SCIENCE FOUNDATION GRADUATE FELLOWSHIP PROGRAM Honorable Mention in 2011 and 2012, as a first- and second-year graduate student.

JIM MCGEE MEMORIAL SCHOLARSHIP Cash award from the Georgia chapter of the American Society of Highway Engineers, one of two awards in 2011.

GEORGIA DEPARTMENT OF TRANSPORTATION SCHOLARSHIP One of ten cash awards in 2010 to students from the southeastern United States.

OFFICE OF RESEARCH AND CREATIVE ACTIVITIES (ORCA) GRANT Competitive research grant to survey Chinese transportation planning practices, one of several undergraduate research awards from Brigham Young University.

FREEMAN-ASIA AWARD Grant to study Chinese finance and globalized engineering at Nanjing University in the People's Republic of China from the Institute for International Education.

EXTERNAL
CITIZENSHIP

Panel Member, NCHRP 08-184, *Framework for Assessing Induced Demand Effects of Various Roadway Investments*. (2023 -)

Member, Provo City Transportation and Mobility Advisory Commission

Transportation Research Board of the National Academies of Science:

- AEP50: Travel Demand Forecasting Member of the committee (2019 —) on travel demand forecasting. Chair of the travel forecasting resources subcommittee and editor of tfresource.org.
- AMS20: Economics and Land Development Member of the committee (2014 — 2022). formerly standing committee on transportation and land use.
- Young Members Council (2019 — 2021). Planning and Environment subcommittee chair.

Reviewer for the following journals:

- Transportation Research Part A: Policy and Practice
- Transportation Research Record
- Environment and Planning B: Urban Analytics and City Science
- International Journal of Sustainable Transport
- Journal of Public Transportation

Member of the following professional organizations:

- American Society of Civil Engineers (2022 -)

- Zephyr Foundation (2020 - 2022).
- Institute of Transportation Engineers (2009-2013, 2018-2020)
- Tau Beta Pi (Utah β '09).
- Young Professionals in Transportation (2013-2018); organizing co-chair of Triangle NC chapter.
- American Public Transportation Association scholar task force (2011 - 2013).

MEDIA

DeBrule, D. (2024). E-scooter safety top of mind after mother's death. *Fox 13 Salt Lake City*. Quoted expert opinion. March 27th, 2024. <https://www.fox13now.com/news/local-news/e-scooter-safety>

Carlisle, N. (2022). Here's what it might cost to ride the Little Cottonwood Canyon gondola. *Fox 13 Salt Lake City*. Quoted expert opinion. November 16th, 2022. <https://www.fox13now.com/news/fox-13-investigates/heres-what-it-might-cost-to-ride-the-little-cottonwood-canyon-gondola>.

McCann, A. (2021). Best and worst cities to drive in. *WalletHub*. Quoted expert opinion. August 31, 2021. https://wallethub.com/edu/best-worst-cities-to-drive-in/13964#expert=Gregory_Macfarlane

Macfarlane, G.S.. (2020). No, Utah County does not have to choose between preservation and growth. *Deseret News*. Guest Opinion, August 21, 2020. <https://www.deseret.com/opinion/2020/8/21/21376479/>

INTERNAL CITIZENSHIP

Department honors coordinator (2019 —). Encourage students to participate in the honors program, and participate on honors thesis committees in the department.

Department undergraduate committee Chair (2023 —), Member (2021 —). Leading curriculum revisions for civil engineering program.

Department faculty development and capital improvement committee (2018 — 2021).