

JOSEPHINE ROPER

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My research develops theories of access to describe how transport systems serve our needs, and how they could be improved, with a particular focus on walkability and sustainable transport modes. My PhD work has 3 arms: the first is building better multi-modal accessibility indices based on a theory of diminishing returns to opportunity. Results for walkability are currently in use on the Colouring Australia open data exchange platform. The second is using property prices to explore the value people place on different types of access. Finally, I'm working on new approaches to gathering people's perceptions of walkability, using an online PPGIS survey to capture imprecise knowledge in a rapid and scalable way.

Prior to transport research I have a background in mathematics, civil engineering and worked in the construction industry. My years in industry were focused on the 'how' of building transport infrastructure. Over time my interest in the 'why' has grown. Pursuing this, I undertook a transport engineering masters and then sought a PhD scholarship. My passion is to undertake research that creates outputs of practical value to government planners and to private industry, thus influencing future urban environments. I contribute a broad perspective, energy and pragmatism to the teams I work in.

EDUCATION

PhD	University of New South Wales, Built Environment Thesis: "Measuring the utility of access through property value" Supervision: Christopher Pettit (primary), Matthew Ng	2020-end 2023
	<ul style="list-style-type: none">• Research elements include:<ul style="list-style-type: none">○ Development of an accessibility index applicable to any mode, using a gravity approach with diminishing returns to opportunities and destination selection based on travel surveys○ Comparison of access between different modes in cities across Australia and some internationally○ Hedonic price modelling using property prices in Sydney for relationship inference with accessibility measures○ Qualitative study of residents' perceptions of perceived walkability• Tools: Python open-source GIS ecosystem, R, QGIS. Committed to releasing my work open source.	
ME	University of New South Wales, Transport Engineering Average: 85 (High Distinction) Core study in traffic management and control, transport planning practice, logistics, transport modelling. Electives in programming, industrial ecology, and engineering ethics	2018-2019 (part time)

MPE-BSc University of Sydney, Civil Engineering 2008-2013
(articulated Bachelor of Science and Master of Professional Engineering program)
Science majors: Pure Mathematics and Computational Science
Engineering major: Structural engineering
Thesis: "Prediction of extreme wind speeds in Australia using historical
thunderstorm data and Weibull distributions"

RESEARCH EXPERIENCE

Research Assistant, City Futures Research Centre, UNSW 2021-current

- AHDAP (Australian Housing Data Analytics Platform) project
 - working on the Colouring Australia knowledge exchange platform – a collaboration with the international Colouring Cities Research Programme
- Value Australia project – a collaboration with the government Valuer General, one of Australia's major banks, and City Futures to develop automatic property valuation models
 - My PhD is partially funded by this project, and I have benefited from attending meetings with senior government and industry partners, and learning from researchers with extensive property value modelling experience
- iMove project
 - Consulting project creating an open data platform for Willoughby City Council to share transport, accessibility, parking and traffic data with their constituents

Research Assistant, University of Sydney Medical School 2013-2014

- Analysing health data using R and designing maps and graphs for a consulting project for a government health organization
- Assisting other researchers with running statistical tests

TEACHING EXPERIENCE

University of New South Wales 2020-2022

Teaching Assistant, Built Environment and Electrical Engineering

- *GSOE9510 Ethics and Leadership in Engineering*
- *BENV2938 Transport Planning*
- Guest lecturer for *BENV2938 Transport Planning* and *BENV7504 Digital Cities*
- Rated 5.56/6 in student feedback surveys (university-wide average is 5.35)

ENGINEERING INDUSTRY EXPERIENCE

Lendlease Engineering 2014-2020

Project Engineer – National Delivery 2018-2020

- My role within this senior team was to lead the standardisation of project cost forecasting and planning tools across Australia. This involved:

- Liaising with stakeholders from across the business
- Creation of new project control tools (primarily spreadsheets involving a high level of VBA programming)
- Travelling to interstate projects to rollout and train over 100 engineers in the use of the tools I had developed

- Estimator** 2017-2018
- Procurement and cost estimating for tenders on upcoming work, and variation estimating for contractual claims
 - Responsible for estimating on tenders and variations up to \$100 million value, and on much larger projects as part of a team of estimators

- Graduate Engineer** 2014-2016
- Engineering team member on a 23km section of the Pacific Highway Upgrade - Oxley Highway to Kundabung:
 - Rotating through site engineering roles - earthworks, bridge construction, piling
 - Managing quality assurance, cost forecasting and driving safety, productivity and program day to day on site
 - I was also asked because of my background in mathematics to undertake other high priority work. The issue concerned counter claims between our client and our insurer where reinforced soil walls (RSW) were found to have corrosion on buried steel straps well within their expected lifespan. Given a limited amount of data, I researched the literature and worldwide standards for RSWs, then made a case using Bayesian statistical techniques. My analysis was effective in making a case for realistic RSW lifespans, and helped settle this multi-million dollar claim without litigation.

PUBLICATIONS

Roper, Josephine, Polly Hudson, Henry Petersen, Chris Pettit, Thomas Russell, and Matthew Ng. 2022. 'COLOURING AUSTRALIA: A PARTICIPATORY OPEN DATA PLATFORM'. *ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences X-4/W3-2022* (October): 229–35. <https://doi.org/10.5194/isprs-annals-X-4-W3-2022-229-2022>.

Ng, Matthew Kok Ming, **Josephine Roper**, Chyi Lin Lee, and Christopher Pettit. 2022. 'The Reflection of Income Segregation and Accessibility Cleavages in Sydney's House Prices'. *ISPRS International Journal of Geo-Information* 11 (7): 413. <https://doi.org/10.3390/ijgi11070413>.

Roper, Josephine, Christopher Pettit, and Matthew Ng. 2021. 'Understanding the Economic Value of Walkable Cities'. In *Urban Informatics and Future Cities*, edited by S. C. M. Geertman, Christopher Pettit, Robert Goodspeed, and Aija Staffans, 277–99.

The Urban Book Series. Cham: Springer International Publishing.
https://doi.org/10.1007/978-3-030-76059-5_15.

Jorm, Christine, Chris Roberts, Renee Lim, **Josephine Roper**, Clare Skinner, Jeremy Robertson, Stacey Gentilcore, and Adam Osomanski. 2016. 'A Large-Scale Mass Casualty Simulation to Develop the Non-Technical Skills Medical Students Require for Collaborative Teamwork'. *BMC Medical Education* 16 (1): 83.
<https://doi.org/10.1186/s12909-016-0588-2>.

Journal Papers in Press

Roper, Josephine, Matthew Ng, and Chris Pettit, 'Incorporating diminishing returns to opportunities in access - development of an open-source walkability index based on multi-activity accessibility'. Accepted for publication at: *Journal of Transport and Land Use*

SELECTED CONFERENCES & MEDIA

Workshop, "Colouring Australia: a new open-data platform for Australian cities", Ng, M., Hudson P., **Roper J.** 7th Smart Data Smart Cities and 17th 3D GeoInfo Joint International Conference, UNSW, 18th October 2022.

Poster, "Using the Colouring Australia platform to collect data on perceived walkability", 7th Smart Data Smart Cities and 17th 3D GeoInfo Joint International Conference, 18th October 2022, UNSW. **Awarded runner-up PhD poster prize.**

Presentation, "Walkability: person-scale measurement," **Roper, Josephine**, Chris Pettit, and Matthew Ng, International Geographers Union (UGI-IGU) Congress, 20th July 2022, Paris-Sorbonne.

Conference Paper and Presentation, "Walking accessibility: a new method and comparison of two capital cities," **Roper, Josephine**, Matthew Ng, and Chris Pettit, Universities Transport Study Group, 5th July 2022 Edinburgh-Napier University.

Presentation, "The real estate value of walkability", **Roper, Josephine**, Chris Pettit, and Matthew Ng, 17th International Conference on Computational Urban Planning and Urban Management, 9th June 2021 Aalto University (online).

Radio, "How can we make Sydney more walkable?", ABC Sydney - Mornings program segment, 8th December 2022,
<https://www.abc.net.au/sydney/programs/mornings/walkability/101748922>

LANGUAGES

English: Native Language

French: approx. CEFR B1