Gerry Casey

I'm a data scientist working on R&D projects in the transportation sector. I'm interested in evidence based decision making and modelling for enlightenment, not post-justification. My research focus is on the use of new and innovative sensor data in combination with novel simulation techniques to better understand urban phenomena. This mostly involves work on large scale, agent based, simulations of cities considering complex human behaviour and how this evolves and changes. The motivation behind this work is to enable more evidence based, data driven public policy in urban planning to achieve sustainable and equitable cities.

Profession
Urban modeller / Transport modeller / Data Scientist

Current Position
City Modelling Lab Lead, Arup

Experience

3 years

Website

https://gac55.github.io/

Location
London

Qualifications
University of Cambridge, PhD, Engineering, *2013 - 2019*

University of Cambridge, MPhil, Engineering for

Key Skills

- Transport systems and agent based modelling
- Fine spatial and temporal resolution modelling
- HPC, parallel and cloud computing
- Life cycle emission assessments and sustainability

Employment History

Arup, City Modelling Lab Lead, London**,** *August 2019 - present*

I am responsible for Arup's global City Modelling R&D programme - the City modelling Lab. I work predominantly on the modelling of urban mobility through a range of modelling techniques, aiming to help answer urban planning questions such as congestion alleviation, emissions reduction and air quality impact mitigation. My main focus is on the development of a range of agent based models (ABMs) for testing transportation scenarios at city scale. Our ambition is to better understand the projected impacts of big infrastructure changes and policy interventions on a wider range of impacts - social inclusion, equity, economic growth and green house gas emissions.

My R&D role straddles both research and more recently applied client project work. We have created novel methodologies (for example this work with Transport for London) which has now matured sufficiently for use in real world policy application. I am currently technical lead for a new project to build a national ABM for New Zealand's Ministry of Transportation and am heavily involved

Sustainable Development, *2012 - 2013*

Queen's University of Belfast, Civil Engineering, *2008 - 2012*

Software skills

Skilled : Python

Familiar : Linux, macOS, git, Docker, Apache Spark, AWS, MySQL/PostgreSQL

Working knowledge : SQL, R, Terraform, NoSQL (DynamoDB)

in a similar project for Transport Infrastructure Ireland. Both these projects are concerned with public transport investments, road pricing and critically their role in achieving sustainable and equitable economic growth.

Arup, Global Transport Prioritised Research Fund Manager, *June 2017 - present*

I am the global transport research fund manager. I help set transportation research priorities, make investment decisions and critically evaluate proposals and research outputs. I also contribute to open call research proposals in the fields of city related transportation data science projects. As part of this I work closely with academia and presently am the industrial supervisor for the following research projects:

1. PhD student at UCL looking at "New forms of data for urban modelling" (*2018 - present*)
2. PhD student at the University of Cambridge on "Implications of highly automated vehicles for operating models in freight and logistics" (*2019 - present*)
3. PhD student at the University of Cambridge on "Resilience in air quality monitoring and control" (*2020 - present*)

I also instigated and manage a project with the University of Texas at Austin on "Cityscape: An in-memory graph-spatial-agent engine for cities".

Through this role I also coordinate the global transport data science community. This involved working with regional and office leaders to identify domain experts with an interest and motivation to move into the data science space. I arranged an upskilling programme (via an online University course) and we now have an active community delivering new services to clients around the globe.

Arup, Senior Consultant, London. *April 2018 - August 2019*

I was responsible for the R&D elements of a global transportation investment. My main focus was on the development of a range of agent based models for testing transportation scenarios at city scale. I also worked on transport demand data generation where I helped create a travel diary App and developed a machine learning algorithm for trip, modal (travel by bus/train/car etc) and travel purpose inference. I was the technical modelling lead on a collaboration with a large transport authority building a first of its kind multi-modal dynamic model for infrastructure and policy scenario testing at scale.

Arup, London UK, Consultant *March 2017 - April 2018*
I was a data scientist working on a range of different transportation applications in the UK, the Middle East, Australia and the United

States. For example, I carried out an analysis on real-time transit operator feeds and road journey time data sets to understand network impacts of incidents and causal relationships.

UC, Berkeley, Visiting researcher, *August 2017*
I co-founded the cb-cities research group which focuses on city scale modelling of urban systems. I contributed research projects to the CE299 module in the Engineering Department and supervised 3 students on studies of OSM & GTFS data.

Shinbone Labs, Cambridge UK, *July 2014 – January 2016*
Director (UK). We worked on cost effective solutions for real-time energy submetering with temperature, light and humidity optimisation. HQ - Oakland, California.

Oger International, Paris, France, *March 2011 – August 2011*

I was a junior engineer working on gap analysis, value engineering and structural analysis. Primarily projects in the Middle East.

Concern Worldwide, Port au Prince, Haiti, *August 2010 – December 2010*

I was a junior engineer working on a temporary shelter program in Tabard Issa in response to the 2010 earthquake.

Publications

Crowd sourced journey times and automated traffic counter volume-delay functions for London (in review). Casey G, Soga K, Silva E, Guthrie P. 2020

Agent based model for city scale traffic simulation: a case study of San Francisco. Zhao B, Kumar K, Casey G, Soga K. 2019

Briefing: High-performance computing for city-scale modelling and simulations, Soga K, Casey G, Kumar K, Zhao B. 2018

A Scalable Agent Based Multi-modal Modeling Framework Using Real-Time Big-Data Sources for Cities. Casey G, Soga K, Silva E, Guthrie P, Kumar K. 2017

Greenhouse gas considerations in rail infrastructure in the UK. Saxe S, Casey G, Guthrie, P, Soga K, Cruickshank, H, 2016

Re-thinking UK transport emissions - getting to the 2050 targets. Pantelidou H, Casey G, Chapman T, Guthrie P, Soga K, 2016

Capital & Operational Carbon - an assessment of the permanent dewatering solution at Stratford International Station. Casey G, Pantelidou H, Whitaker D, O'Riordan N, Soga K, Guthrie P, 2015

Other pieces

PhD Thesis: Investigating the performance of transport infrastructure using real-time data and a scalable multi-modal agent based model

Hello World, Arup City Modelling Lab

Digital Twin - Towards a meaningful framework. Transport, Gerry Casey and Isabel Dedring.