Ahmed Kamel

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Summary

Transportation safety engineer and data scientist (PhD, UBC) with a decade across consulting, a city, a public-insurer research program and a self-founded AI company. Builds Bayesian and machine-learning crash models, travel-demand and traffic models, and production AI tools, and works independently from scoping to report. Four peer-reviewed papers on real-time crash risk from automated-vehicle data. P.Eng. application in progress with EGBC.

Experience

Founder & Applied AI Engineer, Papyrus AI 2025 – Present

- Founded Papyrus AI and built its three products end to end: Librarian for research synthesis, AuditorAI for road safety audits, and Mission Control for drone surveys, under one shared sign-in.
- Librarian: built a multi-agent research platform, now piloted by the BC Injury Research and Prevention Unit, that answers questions over 500,000+ papers with citation-grounded reports.
- Librarian: designed evaluation gates and suites that every change must pass, then used them to test new designs, including a curation layer on in-house models, alternative answer workflows and sequential reasoning.
- Librarian: rejected an in-house re-ranker after a paired test on 66 questions showed it 0.147 MRR@10 worse than the incumbent, with a confidence interval excluding zero.
- AuditorAI: building an assistant that helps certified road safety auditors review drawings, photos and specifications faster and more completely, with the auditor always in charge.
- Mission Control: automated drone-survey missions from planning, controller prep and go/no-go checks to processing, quality control and delivery, with a quality gate on every automated step.

Road Safety Researcher, ICBC / BC Injury Research and Prevention Unit Mar 2025 – Apr 2026

- Turned a research mandate into deployable tools: took the work from literature review to a working risk framework and interactive dashboards for ICBC leadership, with a plan around each deployment blocker.
- Cut crash-prediction error by 60%, turning an unusable model into a reliable one, with a BYM2 spatial Bayesian model that let nearby sites stand in for traffic volumes missing across BC.
- Propagated crash-model uncertainty with GPU Monte Carlo in CuPy, cutting run time from hours to under 30 seconds, and chose camera sites with MILP and a GPU genetic algorithm.
- Reproduced a consultant's multivariate full Bayes crash model for a 9-year before-and-after study, then built a severity-weighted neural network that raised fatal-crash accuracy 23% with no loss overall.
- Rebuilt red-light-camera allocation from a ranking into a genetic-algorithm optimization that captures each camera's spillover effect on nearby sites, with a dashboard that returns the best sites for any budget.

PhD Researcher, Transportation Safety, University of British Columbia Jan 2020 – Jan 2025

- Developed a real-time crash-risk framework from real-world AV data, using Bayesian hierarchical spatial EVT models to estimate the probability of a collision within each short time interval.
- Built pipelines that cleaned 1,000+ hours of Lyft and nuScenes AV perception data, removing duplicate detections from overlapping AVs, parked vehicles and out-of-bound objects.
- Transferred safety models from data-rich Las Vegas to data-scarce Palo Alto with informed priors, which beat recalibration and stayed reliable with 20% of the target site's data.
- Led the BC Ministry of Transportation's conflict-based before-and-after evaluation of high-friction surface treatment, including review of the consultant's conflict-analysis dashboard.
- Served 4 years as a teaching assistant for UBC's surveying course, senior TA from the second year, and also for capstone and sustainability engineering, in classes of 20 to 150 students.

Traffic Technologist, City of Coquitlam Aug 2023 – Sep 2024

- Ran network and corridor screening across the city's intersections and segments, traced crash patterns at the riskiest sites, and turned them into recommendations backed by benefit-cost cases.
- Wrote the city's multi-use-path crossing standards, adapted from provincial and North American city practice, now used to review developers' drawings.
- Designed and optimized signalized intersections in Synchro and tested how proposed safety interventions would affect traffic operations.
- Ran warrant analyses for traffic signals and other traffic control devices under the Manual of Uniform Traffic Control Devices for Canada and TAC guidelines.
- Drafted the RFP for a city-wide speed management strategy.

Transportation Engineer, SETS International – Cairo, Egypt Dec 2015 – Sep 2019

- Built Riyadh's regional travel-demand model from scratch with the modelling team, now used by the city's Ministry of Transportation for strategic planning, traffic impact studies and transit ridership tests.
- Built a decision tool that lets non-technical ministry managers run the Riyadh model themselves, without engineers or consultants, plus sub-area extraction for traffic impact studies.
- Led data collection, network design, modelling, scenario planning, mitigation and mode-choice analysis for Cairo's first shared bike-lane network, with UN-Habitat and Egyptian law enforcement, funded by the World Bank.
- Designed the household, stated-preference and roadside-interview surveys and the screen-line count plan behind the model, and helped calibrate trip generation, attraction and mode choice.
- Supervised junior engineers, teaching assistants and field data-collection teams.

Education

University of British Columbia, PhD in Civil Engineering

- Thesis: Real-time safety and mobility assessment using extreme value theory modeling: an investigation using real-world self-driving vehicles dataset

Cairo University, MSc in Civil Engineering (Public Works – Highways and Traffic); BSc in Civil Engineering

Publications

Real-time crash risk estimation with autonomous vehicle data: a comparative analysis of extreme value models, *Transportmetrica A: Transport Science*, 2025

Transferability of real-time EVT safety models: an investigation using autonomous vehicles data, *Transportmetrica A: Transport Science*, 2024

Real-time combined safety-mobility assessment using self-driving vehicles collected data, *Accident Analysis & Prevention*, 2024

Real-time safety analysis using autonomous vehicle data: a Bayesian hierarchical extreme value model, *Transportmetrica B: Transport Dynamics*, 2023

Skills

Safety and statistics: Bayesian hierarchical and spatial models, extreme value theory, causal inference, network screening, before-and-after evaluation

Transportation: travel demand modelling, Synchro, PTV Vissim and Visum, TransCAD, traffic impact assessment, warrant analysis

AI and engineering: Python, SQL, PyTorch, LLM and RAG systems, Docker, GIS, dashboards