HAOYAN ZHENG

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EDUCATION

B.A.Sc. in Engineering Science (Robotics) + Professional Experience Year (PEY) Sep. 2022 – Jun. 2027
University of Toronto, Toronto, ON

- **Interests:** Transportation data analytics, GIS/spatial analysis, decision-support modelling.
- **Major:** Robotics Engineering | **Certificate:** Cybersecurity Engineering (in progress)
- **Selected Coursework** GIS & Spatial Analysis (ArcGIS); Unsupervised ML; Algorithms & Data Structures; State Estimation & Localization (Python/ROS); Motion Planning.
- **Tools:** ArcGIS, Azure Blob Storage, Git, MATLAB, Microsoft 365 (Power Automate)
- **Programming:** Python (pandas, numpy, scikit-learn), C/C++, Java.

EXPERIENCE

Engineering Associate (PEY Co-op) — Pavement Evaluation & Asset Management May 2025 – Present
Ministry of Transportation, North York, ON

- Managed multi-source pavement datasets (distress, LCMS/vision, FWD, GPR, GPS) in Azure Blob Storage; implemented versioning + WORM, RBAC/SAS access control, SHA-256 integrity manifests, lifecycle policies (hot→cool/archive), and audit trails.
- Built a **K-Means** clustering pipeline across ∼**60,000** road sections; used PCA for dimensionality reduction/visualization to justify selection of **7** most representative test sites for field evaluation.
- Developed Power Automate workflows for pavement distress data submissions; automated data transfer, validation, metric computation, and report generation; reduced manual admin by **8–10 hrs/week**.
- Modeled friction–speed relationships using ordinary least squares; $R^2 = 0.92$ with prediction intervals and residual diagnostics; informed **network-level safety thresholds** and speed-policy discussions.
- Conducted QA/QC of LCMS-based pavement imaging datasets by validating GPS-image alignment and annotating location-specific data points to ensure accurate georeferencing across crack, rutting, and surface-condition outputs.
- Processed Ontario Road Network (ORN) GIS datasets; produced ArcGIS web maps and analytical visuals for program reviews and planning discussions.

Research Assistant (Patient Safety & Data Analytics) May 2024 – April 2025
Michael Garron Hospital, East York, ON

- Contributed to an **AHRQ-funded** Diagnostic Center of Excellence on diagnostic safety and human factors; coordinated literature syntheses across PubMed, Scopus, MEDLINE, and Embase.
- Screened, reviewed, and extracted data from **10,000+** records using Covidence; authored PRISMA flows and data dictionaries to improve reproducibility and auditability.
- Drafted **REB** protocols and materials (recruitment scripts, consent forms, instruments) for patient interviews; ensured ethics compliance and standardized data capture.
- Designed **WHO Patient Safety Day** engagement activities to raise awareness of diagnostic safety among patients, families, and clinicians.

PROJECTS

Topic Modelling of Patient Free-Text Surveys (LDA) *Python, nltk, Gensim, hyperopt, guidedlda*

- Built an LDA topic-modeling pipeline to extract themes from patient free-text surveys; processed responses at $<$ **0.05 s/record**; integrated preprocessing (cleaning, tokenization, lemmatization).
- Tuned **10** hyperparameters with TPE (Bayesian optimization) to improve coherence/perplexity; delivered interpretable topic summaries for stakeholders.

ACHIEVEMENTS

UTMIST Hackathon — Winner *University of Toronto* Mar. 2023
Top team for an applied ML/NLP challenge; rapid prototyping and model evaluation under time constraints.

PUBLICATIONS

Reimaging Health Equity, Equality, and Justice: A Fresh Vision Longwoods Insights (**2024**).
McCallum, E; Scala, N; Mason, T; ***Zheng, H****; Priore, A; Coppinger, T; Sochaniwskyj, M; Pettit A; Hill, MA; Shearkhani, S.*
longwoods.com/content/27405

Opportunities and Challenges for the Application of AI in Evaluations of Healthcare Services Longwoods Insights (**2024**).
Mateus, L; Qu, Y; ***Zheng, H****; Shearkhani, S*
longwoods.com/content/27544

POSTERS

Using Natural Language Processing (NLP) to Uncover Patient Insights from Free-text Survey Responses
Diagnostic Excellence 2024 Meeting (DEX24) at the University of Minnesota
Zheng, H*; Ni, K; Alfred, M; Smith, K. (2024)*
patientpartnereddce.org/dex24