

Sandesh Bhandari

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Research Interests

Statistical and machine learning approaches to urban spatial data — how cities can be modeled, predicted, and understood through geographic and earth-systems data at fine spatial scale. My focus is on problems where the spatial relationships between observations are fundamental to how the data should be modeled, explored, and interpreted.

Education

University of Toronto, Faculty of Arts and Science 2026 – 2028
Master of Science, Department of Geography and Planning

University of Toronto, Faculty of Arts and Science 2026
HBSc. in Geography, Earth and Data Sciences, with High Distinction

- GPA: 3.92/4.0, Dean's List Scholar
- Nicholas Wemyss Undergraduate Explorers Fund Award
- John Horner Undergraduate Scholarship in Geography
- University of Toronto Research Excellence Award (UTEA)
- Undergraduate Computer Applications Award

Research & Professional Experience

University of Toronto, Department of Geography & Planning January 2026 – Present
Research Assistant

- Supporting the primary research mandate through exploratory spatial analysis and rapid data visualization to iteratively test hypotheses and validate assumptions.
- Conducting spatial analysis of residential zoning typologies (R, RD, RS, RT, RM) along major arterial corridors to evaluate densification potential under updated Toronto zoning policies.
- Developing GIS workflows to classify parcel frontage (Front, Flank, Reverse) and model transit catchment zones relative to Major Transit Station Areas (MTSAs).

Web Developer 2019 – Present
Independent Contractor

- Architected and deployed 15+ full-stack web applications using MERN/MEAN stacks (MongoDB, Express, React/Angular, Node.js) for small-to-medium enterprises.
- Optimized front-end performance by migrating legacy CSS to SCSS and implementing Alpine.js for lightweight state management, reducing bundle sizes significantly and improving Lighthouse scores.
- Integrated secure payment gateways (Stripe, PayPal) and third-party REST APIs.
- Managed end-to-end project lifecycles, negotiating contract scopes, setting technical roadmaps, and delivering 100% of client projects on or ahead of schedule.

City of Toronto, Planning Research and Analytics May 2026 – August 2026
Research Assistant

- Conducted field data collection and verified the accuracy of site records.
- Structured and presented collected data to support project reporting.
- Maintained statistical databases to ensure data integrity.
- Gathered employment and land-use data from Toronto businesses to inform municipal planning and future city services.

Selected Projects

Full portfolio: <https://snes19xx.github.io>

Rebuilding the 510 Spadina from its own data [\[Link\]](#)

- Mechanistic Python simulation of the 510 Spadina streetcar built from the TTC GTFS feed and published delay records: riders accumulate at stops, dwell time follows demand, and bunching emerges from the mechanics rather than being imposed on the model.
- Every scenario evaluated as a 400-replication Monte Carlo ensemble with confidence intervals, showing a 39% reduction in median travel time (29.0 → 17.6 min) and a 67% improvement in headway reliability (CV 0.47 → 0.15).
- Published as an interactive editorial webapp: a three.js 2.5D diorama, D3 reliability charts, and a replayed sample of true simulation runs.

Atlas of Canadian Wildfires [\[Link\]](#)

- Interactive atlas of the Canadian National Fire Database: 20,946 fires of 200 ha or more, 1959–2025, totalling roughly 160 million hectares burned.
- Canvas map (D3) replaying 66 fire years on a scrubbable timeline, with explorable statistical layers — kernel density of burned area, Getis–Ord Gi* hotspots, Theil–Sen/Mann–Kendall trend, NBAC reburn counts, and CanLaBS Landsat burn severity.
- A day-by-day view of 2023 replays 1.6 million VIIRS thermal detections across the record year.
- All computation performed in Python and written to compact assets on one shared map frame (NAD83 Canada Lambert), so the browser recomputes nothing and the site ships as static files.

Spatial and Socioeconomic Distribution of Toronto’s Urban Heat Islands [\[Link\]](#)

- Geospatial study of Summer 2025 heat exposure across Toronto, integrating Landsat 8/9 thermal imagery, NDVI composites, and census socioeconomic indicators at the tract level.
- Built month-by-month thermal mosaics (May–August), extracted zonal statistics, and quantified the buffering effect of vegetation (NDVI) on land surface temperature.
- Identified clusters of extreme heat using Getis–Ord Gi* and Moran’s I, analysed the distribution of heat burden across demographic and economic lines, and published the result as an interactive web map alongside publication-quality cartographic outputs.

three.lab [\[Link\]](#)

- A browser-based three.js tool for building, viewing, and editing 3D models and textures, exporting GLB models, SVG vector views, and generated React Three Fiber components (JSX/TSX).
- Generates real 3D city models of anywhere on Earth from OpenStreetMap: footprints pulled from Overpass, projected onto a local metre grid, triangulated and extruded to tagged heights, with multipolygon courtyards preserved and large extents fetched as de-duplicated tile grids.
- Implements a hidden-line-removal engine — topology welding, edge classification (silhouette, crease, boundary, material seam), screen-space DDA occlusion testing with exact edge splitting, and polyline chaining — exporting SVG, 600 dpi PNG, HPGL, or G-code for pen plotters.

Crowdsourced Graduate Admissions Data [\[Link\]](#)

- Scrapes, cleans, and stores TheGradCafe admissions data in a normalized SQLite database, then runs SQL queries characterizing GPA distributions, acceptance rates by GPA range, and the association between GRE reporting and outcomes.
- Benchmarks platform-implied acceptance rates against official University of Toronto and University of Pennsylvania figures, revealing a substantial gap between the two.
- Trains a binary logistic regression on GPA and GRE with Saerens prior adjustment, producing AUC of 0.59 (UofT) and 0.70 (UPenn) — modest signal that cannot predict individual outcomes.

Professional & Community Affiliations

Kensington Market Community Land Trust (KMCLT) — *Community Member*

Canadian Institute of Planners (CIP) — *Student Member since 2023*

American Planning Association (APA) — *Student Member since 2023*

Skills

GIS & Spatial Analysis

ArcGIS Pro, QGIS, CityEngine, GeoPandas, Rasterio, Shapely, GDAL/OGR, OSMnx, PySAL, NetworkX, Google Earth Engine

Programming & Data

Python, JavaScript, TypeScript, SQL, Bash, NumPy, SciPy, Pandas, Polars, Node.js, Tauri

AI & Machine Learning

PyTorch, PyTorch Lightning, scikit-learn, LightGBM, SHAP, Hugging Face Transformers, semantic segmentation (SegFormer), OpenCV, local LLMs (Qwen, TinyLlama)

Design & Visualization

D3.js, THREE.js, React Three Fiber, GLSL/WebGL, Canvas 2D, Leaflet, Folium, Matplotlib, Seaborn, Figma, Illustrator, Photoshop, InDesign