

PhD positions

Built environment professionals, including urban planners and landscape architects, are increasingly using Remotely Piloted Aircraft Systems (RPAS) and 3D data to understand urban heat, tree canopy, and other climate-related risks. This project brings these tools together with environmental justice research to develop practical workflows for more equitable and climate-resilient planning and design.

Future Elements Studio (festudio.ca) is offering **two (2) full-time PhD positions** to undertake this multi-year (2027-2031), NSERC-funded research project on RPAS and their roles in making future cities accessible, enjoyable, equitable, and climate resilient.

Project Summary

As cities become denser and more vertical, planning and design need better ways to understand urban conditions in three dimensions (3D). This research integrates drone-derived 3D models with practice-driven analytics to support design and planning professionals as they move from visualizing cityscapes to using spatial evidence to inform decisions about heat mitigation, tree canopy, and climate resilience. Specifically, this project asks whether a co-designed, drone-based urban data informatics (UDI) workflow can improve decision-making around heat mitigation and tree canopy planning, especially when equity concerns are built into the process from the start.

It has three main research objectives:

1. Synthesize the state of practice through a literature review and practitioner interviews/workshops;
2. Co-design and validate low-cost, multi-sensor drone protocols and an interoperable site-scale data pipeline; and
3. Conduct task-based trials with practitioners to quantify “decision usefulness” and co-develop an adoption best practice toolkit.

This project is deliberately interdisciplinary. Drone-derived 3D data can help document urban heat, tree canopy, and other climate-related conditions in greater detail, but those data become useful only when they are interpreted with attention to equity, professional practice, and local decision-making needs. The two PhD positions are therefore designed to be complementary. One student will focus on geospatial drone informatics and reproducible 3D data workflows, while the other will focus on social equity, practitioner engagement, and the use of these tools in planning and design decisions.

Both students will work closely together to translate complex spatial data into practical, equitable municipal workflows.

Position 1

This position focuses on developing and validating low-cost drone protocols and building a reproducible site-scale Urban Data Informatics (UDI) workflow. In this position, the student will design and execute RPAS mission plans to capture RGB, multispectral, and thermal data across urban settings. Using data from on-site visits, photogrammetry and other remote sensing techniques, you will generate robust digital surface/terrain models, point clouds, and thermal maps. The student will also be responsible for accuracy assessments, quality controls, and setting up reproducible computing environments.

We expect the eligible candidates to have the following qualifications:

- A postgraduate degree in geomatics, remote sensing, and/or geographic information systems (GIS).
- Intermediate scripting skills in Python and/or R, or a strong desire to develop such skills.
- Experience working with 3D data (laser scanning, photogrammetry etc.).
- Experience working with large geo-datasets.
- All faculty-wide admission requirements outlined here:
<https://umanitoba.ca/graduate-studies/admissions/programs-of-study/design-and-planning-architecture-phd>

Position 2

This position focuses on the social equity and planning dimensions of the project. The student will examine how RPAS-derived 3D data can inform decisions about urban heat, tree canopy, and climate resilience in ways that are attentive to environmental justice and to the needs of built-environment professionals. The student will conduct a review of research on drones, urban heat, tree canopy, and social equity; carry out interviews with planners, landscape architects, urban foresters, and other municipal or community partners; and contribute to co-design workshops that translate technical data into planning-relevant indicators, equity assessments, and practical decision-support tools.

We expect the eligible candidates to have the following qualifications:

- A postgraduate degree, or equivalent training, in planning, geography, landscape architecture, environmental studies, urban studies, public policy, or a related field.
- A strong interest in environmental justice, climate resilience, urban heat, tree canopy, green infrastructure, or related urban/environmental issues.
- Experience with qualitative or mixed-methods research, such as interviews, focus groups, workshops, document analysis, or community/practitioner engagement.
- Willingness to work in an interdisciplinary research team and collaborate with technical researchers, built environment professionals, and municipal or community partners.
- All faculty-wide admission requirements outlined here:
<https://umanitoba.ca/graduate-studies/admissions/programs-of-study/design-and-planning-architecture-phd>

The following qualifications are not required, but are an asset for both positions:

- Experience in working directly with professionals and/or community members
- Publications in peer-reviewed journals and/or conference proceedings
- More advanced scripting skills are an asset
- Experience collaborating with individuals outside of your discipline
- Experience related to (but not limited to) urban heat, thermal imaging, and micro-climate modelling
- Experience with GIS, spatial analysis, or mapping.

What we offer:

- **Comprehensive Training:** Cross-training in both technical and qualitative skills, RPAS ground-school certification, and hands-on experience in research dissemination.
- **Impact:** The opportunity to co-author multiple journal publications, present at national and international conferences, and directly shape climate-resilient policies and open datasets in Canadian municipalities.
- **Academic Development:** Mentorship in scientific writing and academic communication, including training on how to prepare manuscripts and present research effectively. Students will be listed as the first author in all peer-reviewed manuscripts resulting from this project, unless a significant amount of work is completed by Yuhao and/or other collaborators.
- **High-Performance Computing Resources:** Access to high-performance computers, a 4K monitor, and a Compute Canada account with up to 5TB of file storage.
- **Conference Travel:** Opportunity to present research findings at national and international conferences. All expenses for conference-related travel are covered.
- **Inclusive Lab Culture:** An environment that prioritizes Equity, Diversity, Inclusion, and Accessibility (EDI+A). We operate with a flat organizational structure that encourages open dialogue, recognizes student ownership of research outcomes, and accommodates diverse learning styles and cultural perspectives. For more general research value and expectation, please see [A message from Yuhao](#) to future research students.

How to apply

The application package, **as a single PDF of less than 10 MB**, should include:

- Up to 2-page resume.
- Up to 2-page (12 font size in Times New Roman, 1.5 spacing) statement on what aspects of this project excite you the most (i.e., motivation), and how you would like to work with the other PhD student in this research.
- At least 2 (but no more than 4) references (Name, Affiliation, and Email address).
- If you used any genAI tool in preparing this application, please provide a statement at the end of your application on which genAI tool(s) you used and how you use it/them.

Please email your application as a single PDF to **Dr. Yuhao Lu (yuhao.lu@umanitoba.ca)**.

Please indicate the position you are applying for by using the subject line: PhD (Position 1) application to FES, or PhD (Position 2) application to FES.

Only the shortlisted candidates will be contacted by the end of September 2026. We anticipate both positions will begin in Summer 2027.

The deadline for both positions is **11:59 PM (Winnipeg time) August 31, 2026**.

We welcome all eligible candidates to apply.