



Available Positions for “Buildings and Floods: Micro-Scale Flood Risk Assessment in Cities” research project

We are looking for motivated post-doctoral fellows and graduate students to investigate urban flood risk. The problem we face is that flood risk assessment is currently reliant on models and databases that were assembled with relatively coarse data about buildings and the landscape. New data-acquisition technologies offer the potential for a huge leap forward in resolution, but also introduce a new set of problems related to data management and the extraction of information. The focus of the project is the "micro" or property-scale characterization of building attributes and drainage details to support a novel flood modeling and risk assessment strategy. Data gathering technologies will include street level photography and lidar scans to obtain complete surveys of urban environments. Machine learning and other advanced analysis techniques will be used to extract information and parameterize urban watershed models. Models will be calibrated with collected field data and used to run climate and system component failure models to assess flood hazard probability. The results will feed into the Linkable Open Data Environment (LODE) developed by Statistics Canada (<https://www.statcan.gc.ca/en/lode>), the Risk and Return on Investment Tool (RROIT) developed by Credit Valley Conservation (<https://sustainabletechnologies.ca/home/urban-runoff-green-infrastructure/rroit/>), and the CanFlood risk modelling toolbox developed by Natural Resources Canada (<https://www.nrcan.gc.ca/science-and-data/science-and-research/natural-hazards/flood-mapping-types-and-process/24264>).

If you are hired as part of this team you will work with a diverse group of researchers in Geomatics, Structural Engineering, and Water Resource Engineering at the University of Waterloo, Carleton University, and the University of California at Los Angeles. The knowledge and experience you will gain will place you at the forefront of fields of stormwater management, urban spatial analysis, and building risk assessment. You will receive advanced training in subjects such as unmanned aerial vehicle piloting, computer vision, geographic information systems, inferential and spatial statistics, urban flood modelling, low-impact development, and risk assessment. At UW, you will be encouraged to participate in the Collaborative Water Program as part of the Water Institute at the University of Waterloo (uwaterloo.ca/water-institute/). This institute is a key part of the strategic emphasis on transdisciplinary water research at UW, with over 150 faculty members and 300+ graduate students. You will interact extensively with partners and have the opportunity to complete internships with private consultants and government partners. At Carleton, you will have the opportunity to participate in specialized training related to the design, construction, and management of Living and Green Infrastructure as part of the CREATE DesignLIFES Network (<https://designlifecivmin.utoronto.ca/>)

We recognize that systemic barriers that have led to the underrepresentation of certain groups in fluvial hydraulics and structural engineering. Individuals from underrepresented groups including persons with disabilities, racialized minorities, individuals from LGBTQ2+, and women will therefore be given every consideration to encourage their participation in this interesting research subject. We also welcome applications from interested Indigenous students in Canada, in particular because there is a recognized problem of flooding in Indigenous communities and needs for more and better emergency preparedness plans and individuals that can help these communities prepare for future climate scenarios.

Available positions include the following:

1. Post-doctoral fellow 2023-2024 – Project manager and researcher - Experience in remote sensing, computer vision, or stormwater management. Will gain experience in project management and lead data acquisition stage of project.
2. PhD1 -Data acquisition in an urban environment. Ideal candidate will have experience in spatial analysis and computer vision. Training in unmanned aerial vehicle piloting, visual sensing, computer vision, and geographic information systems.
3. PhD2 – Building feature classification and parameterization. Experience with structural engineering and computer vision. Training in inferential and spatial statistics, visual sensing, computer vision, and geographic information systems. Possible internship with Statistics Canada
4. PhD3 – Property-scale urban flood modelling. Experience with stormwater management and computational methods. Training in inferential and spatial statistics, visual sensing, geographic information systems, urban flood modeling, and low-impact development. Possible internship with Ontario conservation authority or consulting engineering.
5. PhD4 – Interconnectivity of stormwater with terrestrial and aquatic urban environments. Ideal background in stormwater management, tree growth modelling and hydrology, urban wetlands, urban planning. Training in geographic information systems, unmanned aerial vehicles, spatial analysis, urban hydrology, and low impact development. Internship possibilities with Ontario conservation authorities.
6. PhD5 – Urban flood risk assessment. Ideal background in civil engineering and/or flood-risk assessment. Training in risk assessment, geographic information systems, urban flood modeling, and low-impact development. Possible internship with National Research Council of Canada.

If you are interested in any of the above positions please contact [Bruce MacVicar](#) at bmacvicar@uwaterloo.ca or [Chul Min Yeum](#) (cmyeum@uwaterloo.ca), or check out our websites at uwaterloo.ca/scholar/bmacvica (Bruce MacVicar), cviss.net/ (Chul Min Yeum), uwaterloo.ca/scholar/dtrobins (Derek Robinson), carleton.ca/cee/profile/jennifer-drake/ (Jennifer Drake), sri-lab.seas.ucla.edu/ (Sriram Narasimhan).