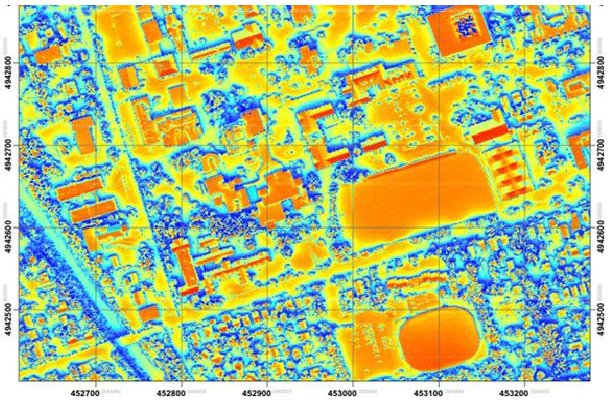
Advanced building performance simulation of predictive HVAC control with climate forecasting

Fully-Funded Post-Doc Fellowship Opportunity

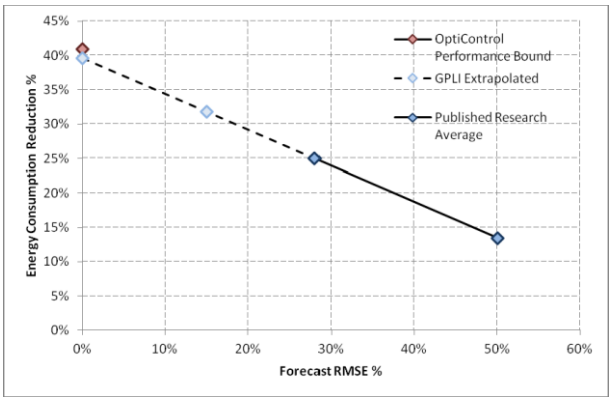
Summary:
This PhD graduate student opportunity at Dalhousie University is part of a multi-year $3.4M research project in collaboration with Green Power Labs Inc. to model and simulate commercial buildings with climate forecasting for predictive building HVAC control. This project will use a powerful building simulator to develop and determine the performance of advanced HVAC control strategies that utilize climate forecasting for optimal equipment operation and to reduce energy consumption, GHG emissions, and energy costs.

Detail:
Commercial buildings are now constructed with highly controllable and responsive HVAC and building energy management systems to ensure occupancy comfort. State-of-the-art controllers have embedded "learning" mechanisms to account for zone characteristics (e.g. thermal mass) determined through a period of operation. The cutting-edge of building energy management research, in which this project focuses, is the use of climate forecast information to adjust the management strategy. In doing so, the new strategy increases utilization and efficiency of HVAC equipment, and can pre-cool or pre-heat the building for economic gain.

The successful candidate will conduct a multi-year collaborative research project with a strong team from academia and industry. They will model a variety of commercial buildings with different climates, HVAC equipment, and pricing tiers. Conventional building energy management systems and controllers will be applied to determine baseline performance and to identify opportunity areas. New control strategies that employ climate forecasting will then be developed in consultation with project partners, and these will be implemented within the building performance simulator. The performance of the new controllers will then be assessed across the variety of commercial buildings to determine the technical, GHG emissions, and economic benefits. These results will be analyzed and transferred to partner Acadia University for use with machine learning techniques for controller hardware.



20 cm resolution urban solar resource map



Impact of forecast precision on energy savings

Position:
The Post-Doc Fellowship is open to highly-qualified domestic and international students who hold a relevant PhD degree. Extensive building performance simulation experience is essential. Fluency in English language is required. The position is fully funded with an annual stipend of $45,000 for two years, beginning Fall 2013. Budget has been allocated to provide an office workstation and access has been granted to powerful and dedicated computing clusters for research purposes.

The successful candidate will be expected to frequently publish research results, attend high-profile conferences, engage with project partners, as well as advise and provide day-to-day management of graduate students. This intensive research period will be carried out under the supervision of Dr. Lukas G. Swan, a knowledgeable and experienced building simulation research engineer.

Interest-application Submission:
Interested parties should submit an interest-application for this position to the below email address. The interest-application should include: cover letter, statement of research interest, detailed curriculum vitae, recent academic transcripts, and an authored manuscript/article that demonstrates the applicant's research quality. The interest-application deadline is August 10, 2013.

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About Dalhousie University:
Dalhousie is Atlantic Canada's leading research university, attracting over $132 million in research grants and awards each year. Its researchers are nationally and internationally recognized for their work. Our researchers are exploring a number of areas including: ocean studies; advanced materials and clean technology; health and wellness; governance; society and culture; information science and communication; agriculture and food technologies; energy and the environment. Dalhousie has three campuses, spread throughout peninsular Halifax, occupying more than 32 hectares (79 acres) of land. Surrounded by a primarily residential area, the university rests in the heart of Halifax, close to the city's major amenities.


Dalhousie University


Halifax Harbour (novascotia.com)