

ABSTRACT/SUMMARY

Hybrid Machine Learning Inspired Digital Built Environment Generation for Energy Modeling

Lead Author: Noushad Ahamed Chittoor Mohammed

Affiliation: University of Prince Edward Island

Other team members or authors:

Dr Kuljeet Grewal and Sudipta Debnath

In the pursuit of sustainable urban development, accurate neighborhood topography plays a crucial role in energy modeling for built environments. This research proposes a novel hybrid method that integrates various data sources, including light detection and ranging (LiDAR), digital elevation model (DEM), digital terrain model (DTM), normalized digital surface model (nDSM), digital surface model (DSM) and drone data, to create precise 3D models of built structures. The primary objective is to refine methodology for complex roof shapes and openings by combining GIS data with drone imagery using machine learning algorithms. This integrated approach aims to develop detailed 3D models of neighborhoods for energy modeling, facilitating a comprehensive assessment toward achieving net-zero energy goals. Furthermore, an automated geometric data processing workflow is developed to streamline the conversion of integrated data into a Rhino-Grasshopper environment for energy modeling. This approach enables rapid creation of energy models, leading to significant savings in time and effort. The research focuses on how insights from these energy models can be translated into sustainable and agile policies, ensuring effective responses to the deep changes impacting the energy sector. By leveraging this combination of data sources, researchers and urban planners can analyze and optimize energy consumption, identify renewable energy potential (e.g., for Net-Zero neighborhood design) and enhance overall neighborhood sustainability. This comprehensive approach to constructing building geometry and topography promises more precise and sustainable community energy modeling, which is essential for developing smart, sustainable net-zero communities.

Poster Presentation

Atlantic Canadian Conference on Energy Systems Modelling

Co-hosted by Energy Modelling Hub and Net Zero Atlantic

June 19-20, 2024 | Moncton, N.B.