Keynote: A collaborative learning framework for energy-efficient buildings

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Abstract: A large proportion of greenhouse gas emissions is generated by energy consumption in buildings. It is expected that, in coming years, the combined effects of population growth, urbanization, global warming and income growth will have an enormous impact in terms of increased energy demand. Extensive research is underway throughout the world in different disciplines to develop sustainable technologies and methodologies that will meet these future energy demands. In this context, this contribution intends to present a computational framework that can be implemented at building and precinct levels to minimise the impact of the building energy consumption and to exploit a wider use of renewables. Particular features of the proposed framework rely on the implementation of collaborative filtering strategies to assist building occupants in supporting energy-efficient behaviours and in the setting up of a federated learning approach to enhance the energy load forecasting. An effective implementation of these approaches requires consideration for the needs of the specific buildings within their urban and climatic context.

Prof. Gianluca Ranzi is a Professor in the School of Civil Engineering and Director of the Centre for Advanced Structural Engineering at The University of Sydney. His research interests range from the field of structural engineering, with focus on computational mechanics, behaviour and design of concrete and composite steel-concrete structures, to architectural science, heritage conservation and mitigation technologies for urban heat island effects. He is an active member of national and international engineering committees, e.g. Standards Australia, ACI and IABSE, and has published over 200 publications, including six textbooks. He is currently the member of the ARC College of Expert.