![International Council for Research and Innovation in Building and Construction logo]

2.7 Annual Report of Polytechnic of Milan Student Chapter

2.7.1 Brief Explanation of the History of the Chapter and its Objectives

In June 2003, the CIB Programme Committee, during its Paris meeting, greenlit the application of the students from the Architecture, Built Environment, and Construction Engineering Department of the Politecnico di Milano (https://www.dabc.polimi.it), as a CIB Endorsed Student Chapter.

The department's mission is to smartly tackle challenges in the construction and built environment sector, providing international expertise to turn problems into opportunities for growth and innovation. The key areas of research include innovative building design, technological and digital transformation, advanced materials, risk mitigation, cultural heritage, and cooperation with emerging countries, particularly Africa.

The Student Chapter aims to:

- Spark research interests among members.
- Strengthen ties with other CIB Student Chapters and the global research community.
- Facilitate joint research and academic exchange.
- Promote internal activities to foster community, connecting with CIB

Membership is open to postgraduate and research students with a keen interest in building research and innovation. Members are expected to actively engage in functions and events organized by the CIB Student Chapter. This joint CIB Student Chapter is integrated into the ABC-PhD, the department's doctoral program, and is accessible to all eligible students (https://www.dabc.polimi.it/en/phd/abc-phd- programme/).

Membership of the student chapter has led to the realization of collaborations between students and researchers, but it is in recent years that the chapter's activities have intensified, also thanks to the introduction of new participants. Here some examples of the lates activities. The student chapter won CIB funding for a joint program with the University of Salford on Post-Covid Collaborations Models. Moreover, Polimi chapter members will present their research articles at CIB WBC 2022 congress in Melbourne. And finally, a member of the Polimi CIB student chapter was selected for CIB World Student Chapter Committee, which would broaden Polimi's networks and open new collaboration opportunities with other CIB student chapters worldwide.

2.7.2 Completed and Upcoming Activities of the Chapter in the Current Year

It is with great honour and pleasure that our student chapter won this year's CIB Sebestyen-future- leaders-award (https://cibworld.org/winner-of-cib-sebestyen-future-leaders-award-2023-announced/), with a proposal for courses and workshops about Integrating Artificial Intelligence in the Building Sector.

The proposal was designed to develop courses and workshops to provide students with the knowledge and skills necessary to integrate AI into the building sector, including building design, construction, operation, and maintenance, with the purpose of creating a link between academia and industry for further collaborations and industrial research.

The completed activities included:

- a summer school course,
- online bootcamps
- lecture series.

All of them were successful and served to promote the CIB's activities and gathered numerous valuable contacts of professionals, students and researchers interested in the proposed topics.

- On July 7th, in collaboration with the CIB W078 commission and during a designated session in EC3 summer school in Crete, Professor Fulvio Re Cecconi and Ania Khodabakhshian delivered a lecture on "Machine Learning Application for Building Energy Performance". This 6-hour lecture consisted of 3 hours of introductory and educational seminars and 3 hours of interactive hands-on exercises.

- On September 11th under the general topic of "AI in construction" a 2 hour lecture was held by leading professionals and researchers in the field. The invited keynote speakers were: Josh Canner from Oracle, Fazel Khayatian from EMPA and ETH and Ania Khodabakhshian from Polimi. The specific topics of the lecture were about The impact of AI on design and construction such as on building performance assessment. At the end of each presentation, a short Q and A session was moderated

by Prof. Re Cecconi, where participants asked questions from the keynote speakers in an interactive manner. 131 people registered for the event (15 CIB Members), which is a great success for such an event, and the event recording is available here.

- On October 11 the first session of the bootcamp on "Machine Learning for Building Clustering and Energy Performance Analysis" was made. The title of the first session was Data Preprocessing for Building Energy Analysis. It started with introducing Python basics and relevant libraries, then participants moved on to decode energy performance in buildings and certificates. Practical skills include accessing global databases, cleaning and preprocessing energy data, and mastering graphical presentation techniques. The recording of day one is available here. 72 people registered and 45 of them participated, which is a great number for such a practical course.

Upcoming activities:

- We will conclude the Bootcamp with the latest two appointments, with 2 sessions of two hours each:
    - 18/10/23 Session 2: Unsupervised Learning Techniques for Building Clustering
    - 25/10/23 Session 3: Machine Learning Modelling for Energy Performance Analysis and Energy Saving Prediction

This bootcamp aims to equip participants with the necessary knowledge and practical skills to leverage ML techniques for analyzing the energy performance of buildings and clustering them based on energy-related parameters.

The bootcamp contributes to the body of knowledge of two main cutting edge and important disciplines: a) Digitalization and automation of decision-making processes in the construction sector using the advancements of AI and ML, and b) Energy retrofit of existing buildings to decrease their energy consumption and carbon emission levels and contribute to the sustainability of the building sector.

We are planning to have at least two other lecture series, held in October and November, on other AI technologies applications in the construction industry;

The first one will be on the 30/10/23 with the following keynote speakers: Luca Rampini – PWC, Juan Diego Nunez Morales – University of Illinois of Urbana Champaign, Yuwei Cao – Polimi, moderated by prof. Re Cecconi. The topics covered will be about Computer Vision ana Image Processing application for performance forecasting, Management and Design.

The one in November will be, most likely, about Parametric design and building optimization, and the details will come soon.

2.7.3 The Planned Activities for the Chapter in the Upcoming Year

In 2023 our CIB Student Chapter has enrolled five new members, all PhD students. This is also thanks to internal promotion activities, word of mouth, and events promoted throughout the year.

In our plans, there will be the possibility of creating a dissemination event where we can showcase the CIB's activities, successes, and completed events to new PhD students. We plan to organize this introduction event between September and November 2024, in a structured manner. For the current year, the willingness of the CIB executive board to organize an online

presentation to introduce the activities of the CIB to new PhD students starting activities in November 2023 will be assessed.

Given the great success and participation of the lectures in AI we will consider holding more meetings. We would like to involve other CIB members, broaden the type of topics proposed, and positively exploit the expertise of various committees. We will certainly try to give value to the list of contacts we have acquired during the organized events.

Furthermore, if there are new collaboration opportunities proposed by CIB in the upcoming year, such as awards, conferences, workshops, and publications, we would like to actively participate and collaborate with other CIB student chapter, as our previous collaboration experience with Salford University was valuable and intense. Given the diverse and extensive backgrounds and research directions of the PhD students and professors at our department in Politecnico di Milano, we are willing to participate also in activities organized by other commissions and involve more members in the process.

2.7.4 Contact Information of the Executive Members of the Chapter

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