



POLITECNICO
MILANO 1863

Supervisor Expression of Interest MSCA - Marie Skłodowska Curie Action - (PF) Postdoctoral Fellowship 2024

Supervisor name: Alper Kanyilmaz

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Link “Pagina docente”:

https://www4.ceda.polimi.it/manifesti/manifesti/controller/ricerche/RicercaPerDocentiPublic.do?EVN_PRODOTTI=evento&k_doc=297768

Department Name: DABC (+ DEIB co-supervisor)

Research topic:

MSCA-PF Research Area Panels:

- ECO_Economic Sciences
- ENG_Information Science and Engineering**
- ENV_Environmental and Geosciences
- LIF_Life Sciences
- MAT_Mathematics
- PHY_Physics
- SOC_Social Sciences and Humanities
- CHE_Chemistry

Brief description of the Department and Research Group (including URL if applicable):

Alper Kanyilmaz (supervisor): [Dr. Kanyilmaz](#) is an assistant professor in the DABC, Politecnico di Milano. He published more than 80 articles in high-end international journals and peer-reviewed conferences (h-index 15, citations 979, February 2024). Since 2010, he completed 2 EU projects as coordinator, with a total budget of €3,8 million. In 2024, he won as coordinator MSCA project scoring 99/100 points. Currently, he is coordinating 2 EU projects with a total budget of €5,7 million. He is working with data-driven methods to digitalize and automatize a low-emission built environment.

Daniele Loiacono (co-supervisor): Associate Professor at the Department of Electronics and Information of Politecnico di Milano. His research interests include machine learning, evolutionary computation, games and AI applications for construction industry. He has authored over 100 papers in refereed international journals and international conferences (h-index 27, citations 2500, February 2024)



TITLE of the project: Sustainable building structures powered by Artificial Intelligence

Brief project description:

Traditionally, decision-making at conceptual design stage is led by senior engineers whose biases towards familiar methods may limit the exploration of sustainable and cost-effective design solutions. This MSCA research will propose to leverage AI to transform the early stages of structural design, fostering a broader range of sustainable designs. The MSCA project will expand upon our [patented AI-based tool](#), which employs the NSGA-II method to broaden the scope of design alternatives by analyzing variables such as materials, structural layouts, and environmental impacts from initial project briefs. The project aims to enhance the tool into a mixed-initiative system that facilitates richer interaction between the AI and the designer, enabling the generation of more effective and sustainable designs to advance sustainable and efficient design practices in the Architecture, Engineering, and Construction (AEC) industry.

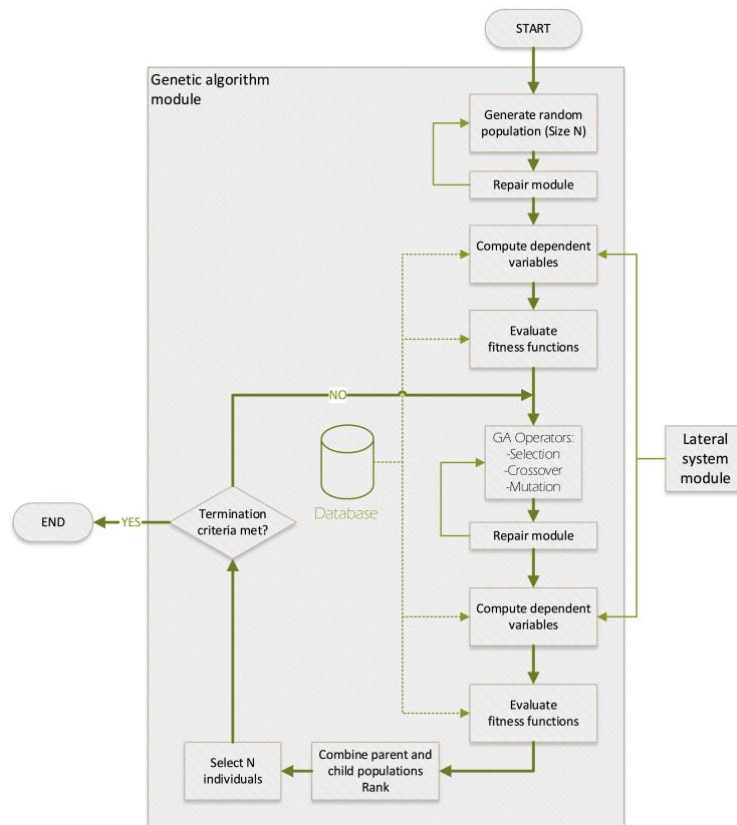


Figure 1 AI-based conceptual design, DABC-DEIB cooperation, [Kanyilmaz, Loiacono, 2022](#)

The project represents an interdisciplinary effort. DABC will contribute its expertise in structural engineering, architecture, conceptual design, and sustainability assessments, while DEIB will provide its experience in artificial intelligence, specifically in data-driven optimization techniques for early design phases. The project will utilize cutting-edge Evolutionary AI, co-developed by DABC and DEIB, to systematically evaluate design alternatives across a spectrum of criteria, including material efficiency, structural integrity, and environmental impact. The MSCA-IF candidate will engage in an interdisciplinary training lab, mastering the integration of AI-driven tools with architectural and structural engineering principles. This aims to cultivate a new generation of engineers and architects capable of creating optimized, environmentally conscious, and economically viable building designs.