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Istructure: An Open Source Structural Design Framework

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Istructure: An Open Source Structural Design Framework

Provide an Abstract

The design stage of a product, either a structure or a machine, plays a fundamental role in the Product Life Cycle, from where the minimum quality of the product is stablished. In addition to the national and international standards for the design of structures and machinery, numerical methods and Artificial Intelligence have become key tools for an optimum design approach, which helps to predict structural behavior under different load conditions.

To optimize the process of design, structural and cost analysis, we created the iStructure project, which is a manufacturing tool that automate the design of structural members. It is a python-based framework library that, in its first version, can automate the design procedure of Mezzanine Floor Racking Systems. It allows the user to: specify the cross-section geometries of the structural members and predicts its geometric properties by the Finite Element Method – FEM; define the modular area distribution per floor; select the minimum cost cross-sections of the structural members which can resist the specified load conditions; create an automatic report, in LaTeX/PDF, which illustrates the design procedure (according to ANSI MH16.1, AISI S100 and ASCE 7-16 North American standards) and the costs of the structure; and elaborates automatic 3D CAD plans in DXF format.

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Juan David has completed his Master of Science studies in Mechanical Engineering at the Universidad Industrial de Santander, Colombia, in 2021. He is currently studying a PhD in Mechanical Engineering at the same university,
where he joined the GIEMA research center of Prof. Andrés González. He has made an oral presentation at the XI
Colombian Congress of Numerical Methods and is the inventor of a patent with the title: "Equipment, process and
product obtained from plant material with biological properties" and reference CO2018013023A1. He is also a
programmer with interest in automation and deep learning.

Presenting author headshot

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