



**Politecnico
di Torino**

Honors Thesis

Master of Science in Architecture Construction City

Abstract

**Parametric modeling and Generative design: the bio-inspired project of an
architecture in symbiosis with nature**

Tutor/Correlator

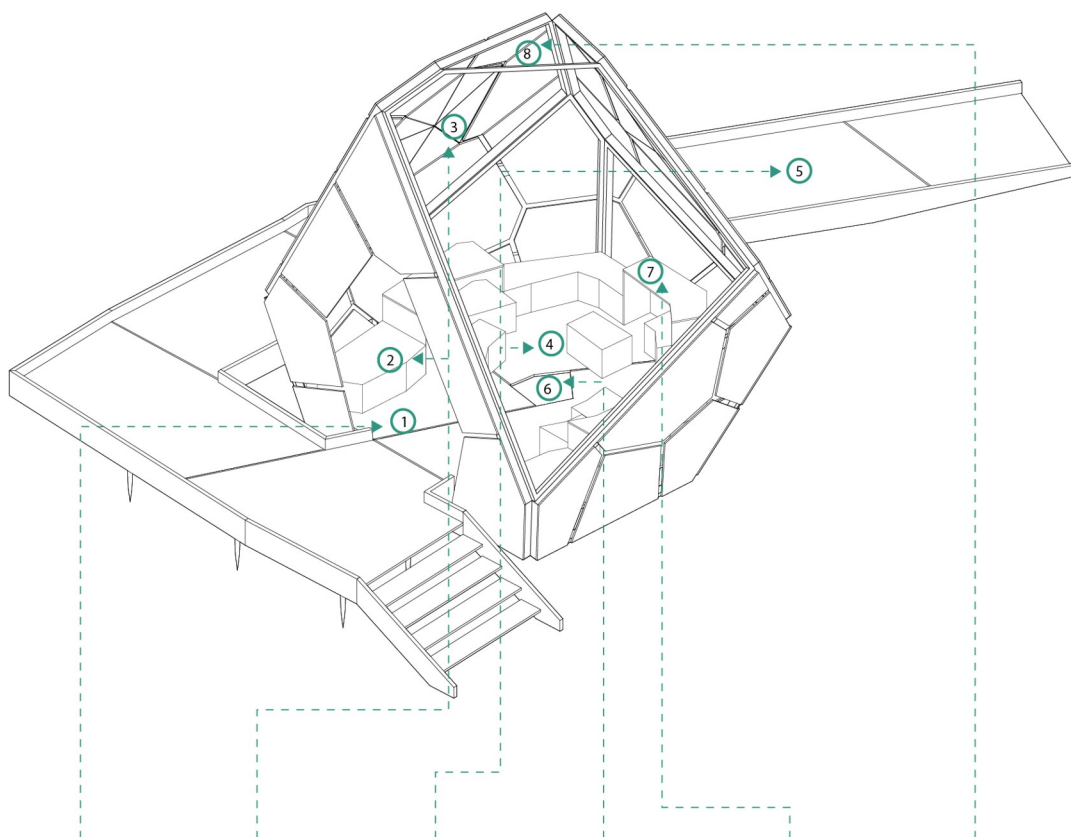
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The research work comes from the curiosity and the intention to investigate contemporary issues about innovation of software and techniques that have recently faced the panorama of tools for architecture and that will affect the work of designers. Digital automation and the development of these tools highlight new possible approaches to design and architecture planning. The thesis, which consists in three sections, traces the process of study and investigation of the methodology in use, culminating in the application of a project for a competition promoted by Spazio Thetis, where it was proposed an architecture pavillion in symbiosis with nature. The tree, the key element of the project, contributes to define and shape the pavilion according to the morphology and conformation of the foliage and the trunk. In the first section are analyzed and described the skills acquired with reference to computational design, Visual Program Language and Generative Design tools. In the second part, the topics of the project proposal are presented. The investigation process has led to the study of wood as a renewable and ecological material, of the physiological and psychological benefits brought by Forest Therapy and Outdoor Education. The following investigation on Digital Fabrication shows how it is possible to generate, through the use of numerical control machines, a physical object starting from a digital model. The last section illustrates the idea of a pavilion in symbiosis with nature, an architecture that has been integrated with a tree. The result obtained is the result of the implementation process of the studied methods that, together with the analysis of the users' needs, allowed to define the parameters on which to develop the proposals. The pavilion has been realized through the use of modeling and optimization software that makes use of evolutionary algorithms. The project pays particular attention to the technical and economic feasibility involving craftsmen and companies in the field of woodworking and 3D printing. The relationship of exchange and collaboration has led to the production of the study models in scale.



Docente

① Ambiente attrezzato per la didattica e la sicurezza dei bambini.



Bambini

② Sedute e piani di appoggio.
③ Legame con il paesaggio tramite fughe, pannelli cinetici e albero.



Disabili

④ Fruizione degli spazi per persone con disabilità. Larghezza minima di 110 cm.
⑤ Accessibilità tramite rampa con larghezza maggiore di 150 cm per il passaggio di due carrozzine.



Visitatori esterni

⑥ Valorizzazione della natura con l'albero centrale e permeabilità della struttura sul paesaggio circostante



Smart worker

⑦ Presenza di piani d'appoggio per apparecchi elettronici



Addetti alla manutenzione

⑧ Sicurezza nel montaggio e smontaggio nel rispetto delle condizioni ambientali del sito





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