

Combinatorial Surface & Solid Design

Polygonization and Polyhedralization

Background and aim:

In digitalization and industrialization of housing production, it is a challenge to provide affordable quality solutions at scale. Modularity of building products can provide for efficient production as well as diversification of the building stock by means of combinatorial variations. We aim to develop methods in computational geometry for mass-customization of housing design-build processes based on standardised architectural modules.

Research question:

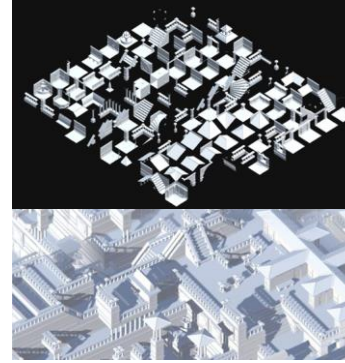
How to design the Stereotomy of a limited set of blocks to provide a large combinatorial surface/solid design space?

Design objective:

To design and prototype a computational and participatory process for modular polygonal/polyhedral shape design.

Methods:

- Geometric Design and Tessellation
- Topological Polygonization & Polyhedralization
- Iso-surface Algorithms (Python or C#)
- Automatically writing Open-Standard Data Models

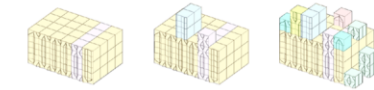
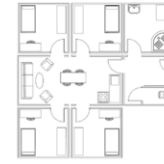
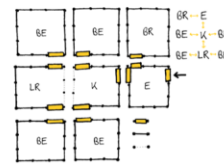


Modular tiling



Image Credits: Marian42 and Oskar Stalberg

Forming



As the building grows, more tiles are added and the facade is enriched.

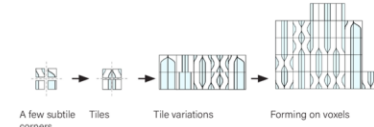


Image Credits: Hugo van Rossum, Maren Hengelmolen, Liva Sadowska, Sander Bentvelsen, Spatial Computing Architectural Design Studio - 2020 - CUB3D

Building Technology Graduation

Theme: Computational Design/Generative Design

Info: Pirouz Nourian p.nourian@tudelft.nl

Mentor team: Dr. Pirouz Nourian/Ir. Shervin Azadi (Design Informatics), Prof. Thijs Asselbergs/Ir. Roel van de Pas, Advisor: Dr. Rafael Bidarra (Computer Graphics)