A Biomimetic Approach to Architecture and Design

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Petra Gruber projects

SPACE
bioinspired design for space

BIOSKIN
energy efficient facade of the future

BIORNAMETICS
patterns from nature for architecture

GrAB
Growing As Building
Biomimetic design proposals
pillbug shell, katharina fuchs 2007

shape/space change

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Transformation structure|space
2005
space loggia, stefano caneppele

shape/space change
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Lunar Base Design
Vienna University of Technology, Alcatel Alenia Spazio 2005
bioinspired energy efficient facade systems

- adaptive
- multifunctional
- integrated
- dispersed
- energy efficient
- communicative
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self shading by shape
cacti

assumption
area: ~ 450m²
height: 80m
8 different shapes

analysis:
influence of shape on energy management
self shading – passive cooling effect

BioSkin Research potential for bioinspired energy efficient facades

[D. Bach, FH Villach, Masters Biomimetics in Energy Systems]
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Science to architecture: design by research

Working models

15_Pufferfish

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Simulations

12_Giant clam

Rules:
- Width growth
- Curvature degree
- Translation height
Science to architecture: design by research

Fibres and bundles
Global and local shape change
Adaptivity and reactivity

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GrAB - Growing As Building
takes growth patterns and dynamics from nature and
applies them to architecture with the goal of creating a
new living architecture.

Barbara Imhof, Petra Gruber
Waltraut Hoheneder, Viktor Gudenus
Damjan Minovski, Tanja Oberwinkler
Julian Vincent, Thomas Speck
Angelo Vermeulen
Andreas Körner, Rafael Sánchez
Ceren Yönetim, Mohammedneja Shikur
GOALS

1. Study of biological growth principles
   - Computational & experimentation

2. Integration of biology in material systems
   - Computational & experimentation with living organisms

3. Interventions in existing architecture

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Establishment of the BIOLAB at the University of Applied Arts

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research at BRIC

• further exploration of the overlap between architecture, arts and biology

• material and structures
• selfassembly and selfdesign
• energy
• sustainable design

• link to additive production technologies
• establishment of the biomimicry fablab
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thank you!

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