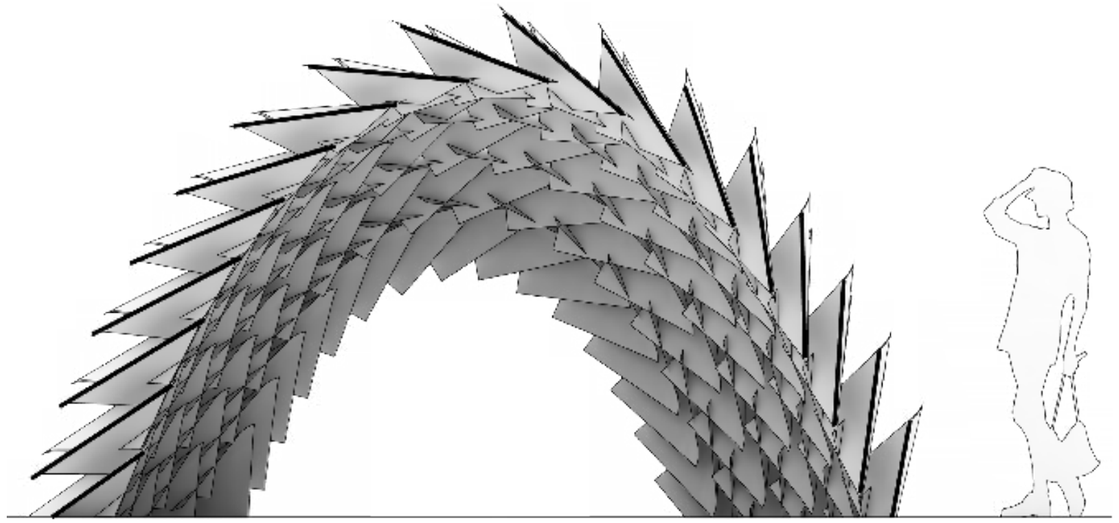
DRAGON SKIN PAVILION

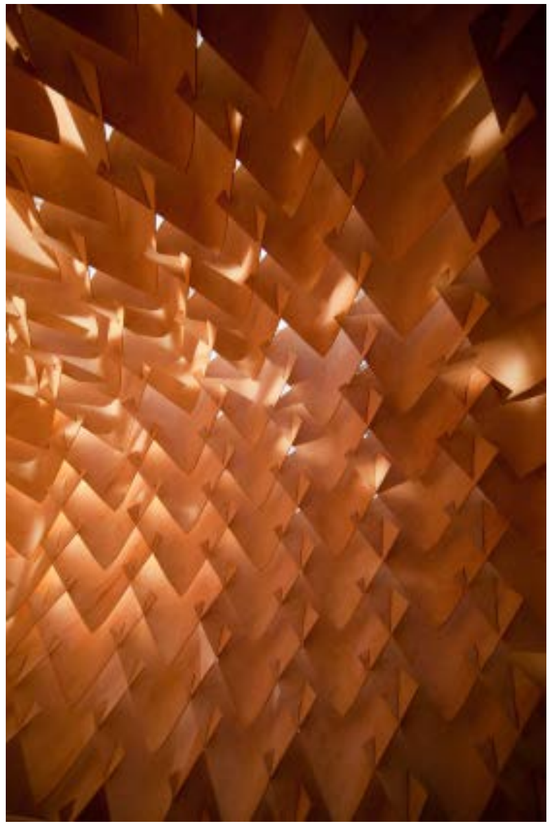
The Dragon Skin Pavilion is an architectural installation designed and built for the 2011-12 Hong Kong & Shenzhen Bi-City Biennale of Urbanism\Architecture.

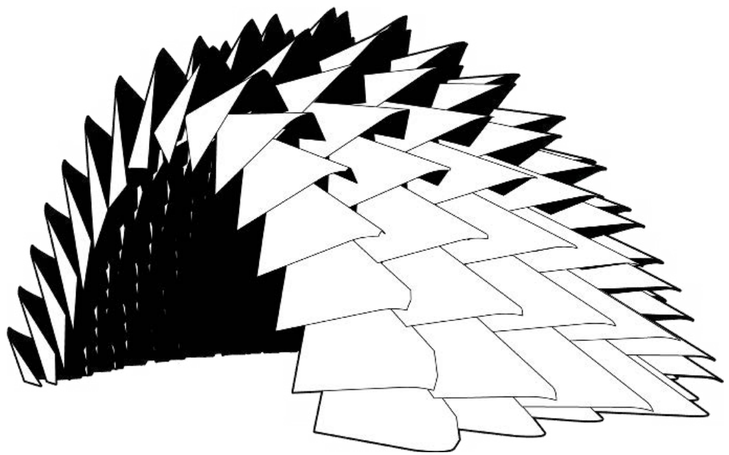
The Pavilion utilises a newly developed environmentally friendly material called "post-formable" plywood, which incorporates layers of adhesive film to allow easy single-curved bending without the need for steam or extreme heat. With no material loss, a CNC mill divided 21 of these 8x4 plywood sheets into eight identical squares, and accurately cut the unique connection slots that were programmed into the pavilion geometry by computer. Using one single mould, all panels were bent into the same shape, and within six hours the numbered shells were slotted into place without using any plan drawings, glue or screws. The underlying equilibrium surface geometry removed all internal forces and deformations from the pavilion, which became a self-supporting, free-standing, light-weight skin with highly tactile tectonic properties and unique lighting effects.

The structure challenges and explores the spatial, tactile, and material possibilities that architecture can offer by revolutions in digital fabrication and manufacturing technology. The Dragon Skin Pavilion redefines the role of architectural design in construction by actively working with the material's basic properties and pushing its structural performance, while being aware of the aesthetic values and effects the system provides.

The pavilion is the product of a collaboration between the Laboratory for Explorative Architecture & Design (LEAD) and EDGE Laboratory for Architectural and Urban Research (Tampere University of Technology, Finland). It was designed by KristofCrolla (LEAD), Sebastien Delagrange (LEAD), Emmi Keskisarja (EDGE), and PekkaTynkkynen (EDGE) and builds upon expertise from a first prototype constructed during an architectural design workshop "Material Design & Digital Fabrication" at the Tampere University of Technology.







Design Agency
EDGE Laboratory for Architectural and Urban Research, Tampere University of Technology, School of Architecture, Laboratory for Explorative Architecture & Design Ltd. (LEAD)

Design Team
KristofCrolla (LEAD), Sebastien Delagrange (LEAD), Emmi Keskisarja (EDGE), PekkaTynkkynen (EDGE)

Client
2011-12 Hong Kong & Shenzhen Bi-city Biennale of Urbanism\ Architecture

Location
Kowloon Park, Hong Kong, China

Photographer
Dennis Lo Designs

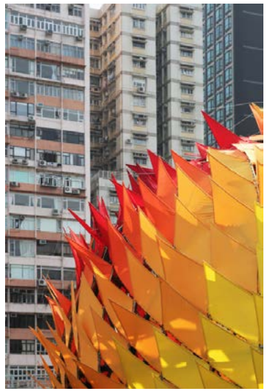
GOLDEN MOON

The Golden Moon is a temporary architectural structure that explores how Hong Kong's unique building traditions and craftsmanship can be combined with contemporary design techniques in the creation of a highly expressive and captivating public event space. It is the 2012 Gold Award winning entry for the Lantern Wonderland design competition organised by the Hong Kong Tourism Board for the Mid-Autumn Festival and was on display for 6 days in Hong Kong's Victoria Park.

Traditional materials for making lanterns, such as translucent fabric, metal wire and bamboo, have been translated to a large scale. A light-weight steel geodesic dome forms the pavilion's primary structure and is the basis for a computer-generated grid wrapped around it. This grid is materialised through a secondary structure from bamboo. For this, Hong Kong's traditional bamboo scaffolding techniques were used – a high-speed, instinctive way of building scaffoldings for e.g. the city's many skyscrapers. This highly intuitive and imprecise craft was merged with exact digital design technology to accurately install and bend the bamboo sticks into a grid wrapping the steel dome. This grid was then clad with stretch fabric flames, all lit up by animated LED lights.

The bamboo and flames follow a pattern based on an algorithm for sphere panellisation that produces purity and repetition around the equator and imperfection and approximation at the poles. This gradual change, combined with the swooping and energetic curves that define the geometry, creates a very dynamic space that draws spectator's view up towards the tip. By putting the axis of this cladding grid not vertical but under an angle, the dome gets an asymmetric directionality. This motion is reinforced by the entrance which is placed along this tilted axis to draw people into the sphere and where they get swept away along the grid's tangents and vectors. The colouration of the pavilion amplifies this effect of submergence in a light wonderland. On top of the black painted steel structure, which forms a neutral base, eight different, saturated colours of stretch fabric are used for the flames. The colours gradually range from ivory and yellow to intense orange, red and deep bordeaux. The brightest colours are used at the tilted base whereas the darkest colours are used at the pole where they, together with the more scrambled geometry, make the pattern disintegrate into the black night sky.

The Golden Moon builds up on research into "building simplexity", the building of

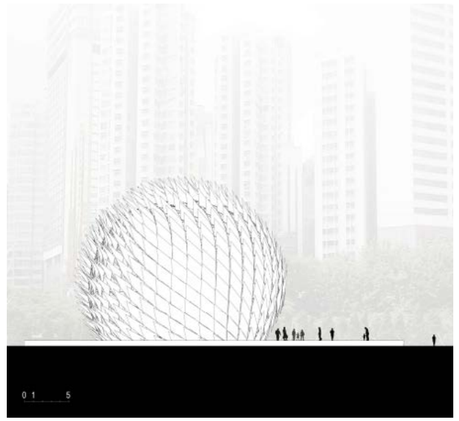


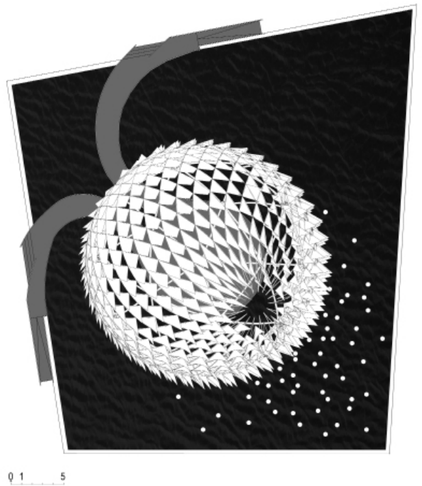
Competition Design
Kristof Crolla of LEAD and Adam Fingrut

Project Management
Laboratory for Explorative Architecture & Design Ltd. (LEAD)

Location
Hong Kong S.A.R. China

Photographer
Kevin Ng, Grandy Lui and Pano Kalogeropoulos





complex geometry and space using the simplest of means. In this research we strategically combine digital design techniques, such as computer programming or CNC fabrication, with traditional crafts and basic materials. In this project procedural modelling techniques were used to control the production of the unique geometry: a sphere that is wrapped with a diagrid according to a Fibonacci sequence that produces order along the equator and randomness at the poles. Code was used for the production of simple drawings that would allow the labour force to mark up intersections between the steel structure and bamboo easily. These drawings took traditional bamboo scaffolding construction detailing into consideration in the definition of installation tolerances. Optimisation scripts were finally used to reduce the amount of unique stretch-fabric "flames" from 470 different units to 10 different types that could stretch and adapt to the various conditions in which they were applied. All details and construction procedures were devised to allow for a high-speed production as only 11 days of onsite construction were available for this 6-storey-high pavilion. To bring the project to a successful end within the limited time available, a very close conversation with the craftsmen was required from the beginning. Preconceptions of building methods and familiar construction techniques had to be abandoned by all parties as both the digital and the material world demanded a new design and building set-up to be devised. This project shows an alternative way for digital design to be materialised into a more humane environment with real-world conditions like limited time frames, low budgets, minimal precision but human flexibility, creativity and ad-hoc inventiveness.