

Nilufer Kocabas

Paper: Exploration of Arbitrarily Shaped Surfaces



Abstract:

Exploration of arbitrarily shaped surfaces through linear members using a self-organizing spring system. Similar to the problem with British Court Museum Roof and Anthony Gormley’s Body/Space/Frame project, a generative algorithm was developed in order to approximate the geometry of a complex curved surface and optimize the resulting structure.

Regarding the approximation of the curved surfaces, in the thesis, it was aimed to address the problem by using linear members defining an arbitrarily shaped surface as nearly as possible in relation to curvature conditions.

In order to tackle this problem, the hypothesis was creating a bottom up self-organizing system that is based on local decisions. By using a bottom-up methodological approach and creating a self-organizing system, it is aimed to overcome the problems that might occur when the curvature is in two or more dimensions. Regarding to that, a generative algorithm that is re-arranging the nodes and providing the connections by using a spring system, is developed. Various experiments are performed in order to determine the closest match of the surface shape and changes of spring length due to curvature. After analyzing the results in the aspect of geometry and topology, results indicates that the method is capable of describing an arbitrarily shaped surfaces as nearly as possible in relation to curvature conditions by using linear members.

Topic: Architecture

Author:

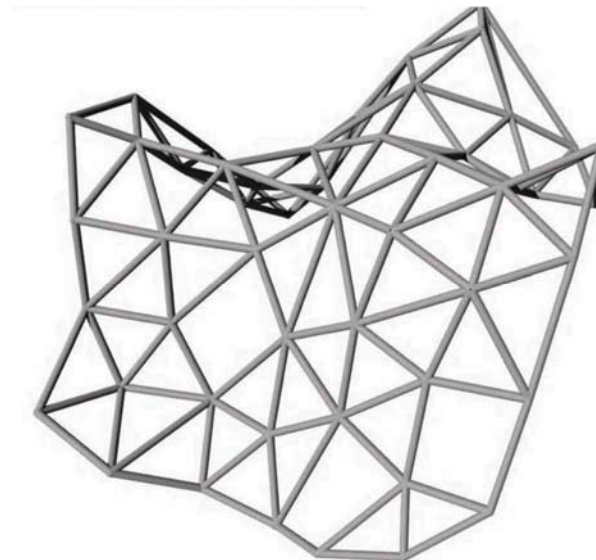
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References:

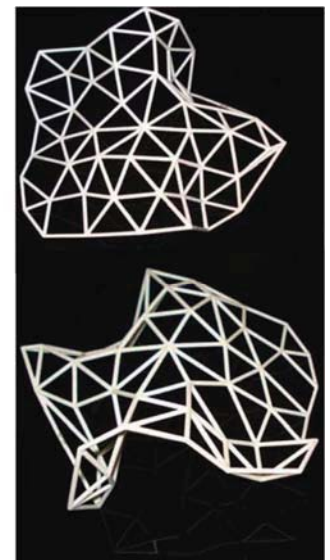
[1] Chris Williams, “The Analytical and Numerical Definition of the Geometry of the British Museum Great Court Roof”, University of Bath Opus Online Publications, United Kingdom, 2001

[2] Sean Hanna, “The Generative and Analytic algorithm in Design”, Emergence and Convergence: lecture notes, pp 6-10, United Kingdom, 2006

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The end result, the geometry obtained in Processing is exported to Rhino.



The end product, obtained through 3D fabrication method.

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Keywords:

Adaptive, Anthony Gormley ,bottom-up approach, curvature, double curved surfaces, self-organisation, spring system