

SENTIENT CHAMBER

CULTURAL PROGRAMS OF THE NATIONAL ACADEMY OF SCIENCES
WASHINGTON, D.C. - 2015

Philip Beesley
Living Architecture Systems Group



I Sentient Chamber installation view. Cultural Programs of the National Academy of Sciences. Washington, D.C. - 2015

First edition

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INTRODUCTION

Located within the National Academy of Sciences in Washington, DC, *Sentient Chamber* is a free-standing pavilion that combines three new systems of structure, electronics and software controls. This experimental architecture and sculpture installation acts as a test-bed for ongoing research that combines the disciplines of architecture and visual art, computer science and engineering, and synthetic biology.

The new structural system is organized by a hybrid triangular flexible space-grid, stiffened by expanded-mesh hexapods that support telescoping posts and spires contacting the floor and ceiling for stability. This structure offers minimal material consumption, achieved through highly efficient advanced manufacturing employing laser machining and thermal forming of expanded meshwork. Tensegrity coupling is featured, employing metal rod cores that stabilize the system surrounded by expanded meshwork hyperbolic shells that provide alternating tensile and compressive support.

Electronic controls employ powerful microcontrollers, expanded by custom circuitry for local communications, power control and sensor feedback. Proprioception is a particular feature of this new system. Arrayed electronically controlled acoustic and kinetic mechanisms are accompanied by sensors that provide internal feedback to the control system, supporting machine learning. In turn, these nested arrays are supported by a central computer configured with three coupled control softwares, providing a test-bed capable of orchestrating pre-scripted behaviours, relationships between components, and learning functions. Currently under development is a new curiosity-based learning system. The system offers interactions with viewers that include spatially imaged sound, light, vibration, and concentrated movement mechanisms, each supported in overlapping nested arrays housed within the hybrid structural system.

Sentient Chamber was created in collaboration with the Living Architecture Systems Group, a partnership of architects, engineers, scientists, and artists from Canada, the U.S., and Europe currently led by University of Waterloo collaborators Philip Beesley, Dana Kulic, and Rob Gorbet. *Sentient Chamber* is exhibited at the National Academy of Sciences Building on the Washington Mall from November 2, 2015 - May 31, 2016. The exhibition is organized by the Cultural Programs of the National Academy of Sciences (CPNAS) and the National Academies Keck Futures Initiative (NAKFI), with support from Ralph J. and Carol M. Cicerone and with the assistance of The Catholic University of America School of Architecture and Planning and Virginia Tech School of Architecture + Design.

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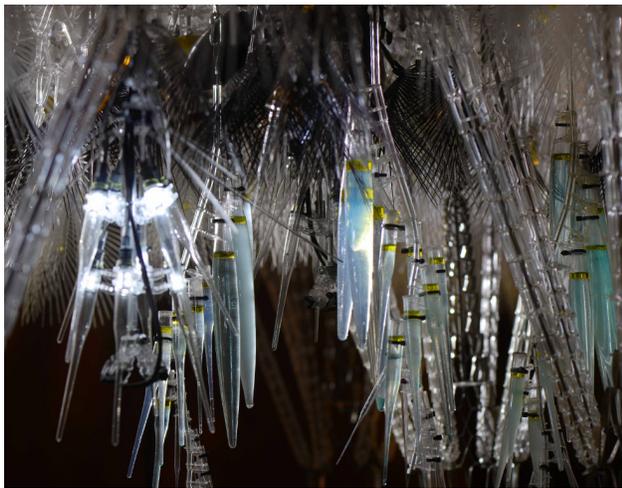
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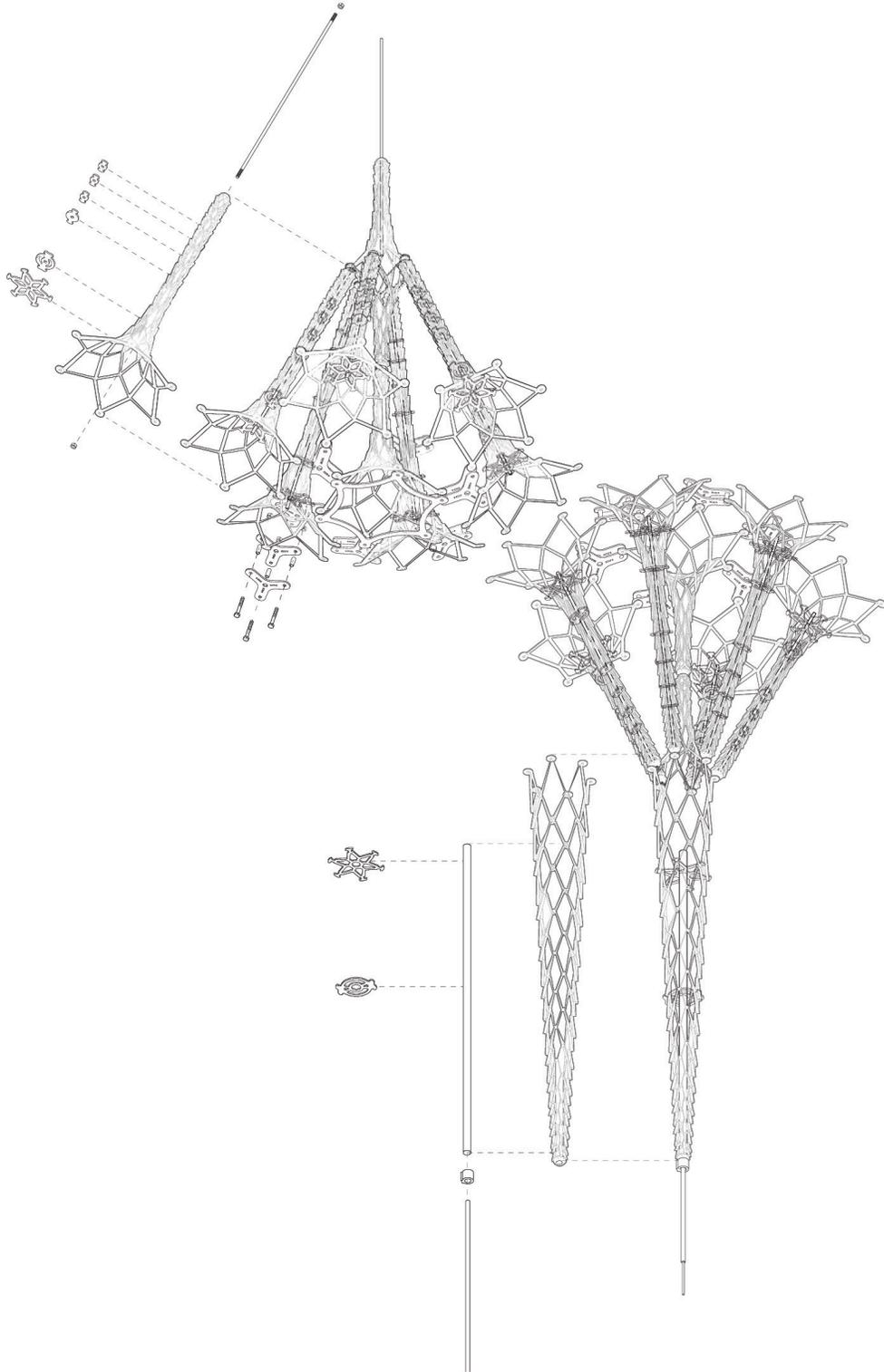
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