Living Architecture Exploration Kits: Introductory Assemblies

Living Architecture Systems Group

This folio describes introductory assemblies that can be created by using a series of exploration kits that have been developed by the Living Architecture Systems Group. An accompanying volume entitled Living Architecture Kits: Component Catalogue provides detailed documentation of component patterns and individual device assemblies contained within the kit series.

These kits encourage experimentation with interactive architectural constructions, supporting design of combinations of individual components within multiple distributed arrays. The physical kit components that have been included within this construction system are part of an evolving collection of tools and component designs that have been developed by the Living Architecture Systems Group under Creative Commons licensing.

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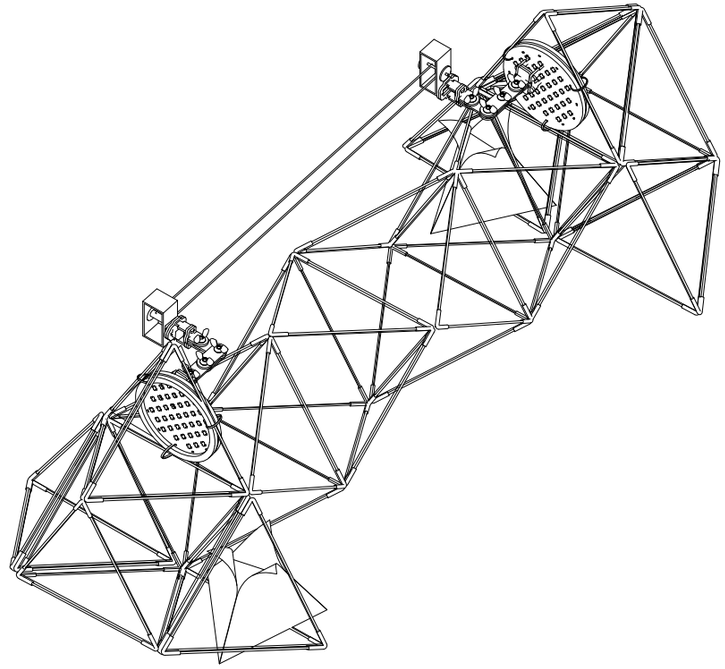


Living Architecture Exploration Kits

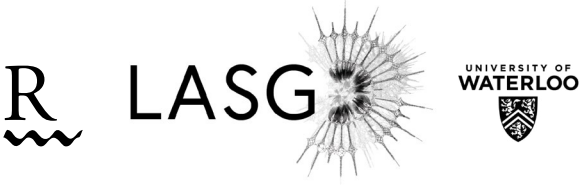
INTRODUCTORY ASSEMBLIES

PHILIP BEESLEY, MICHAEL LANCASTER
& LIVING ARCHITECTURE SYSTEMS GROUP

R LASG UNIVERSITY OF WATERLOO

Living Architecture Exploration Kits
Introductory Assemblies

Philip Beesley, Michael Lancaster
& Living Architecture Systems Group



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About the Living Architecture Systems Group

The publication forms part of a series of work-in-progress reports and publications by Living Architecture researchers and contributors. The Living Architecture Systems Group is an international partnership of researchers, artists, and industrial collaborators studying how we can build living architectural systems— sustainable, adaptive environments that can move, respond, and learn, and that are inclusive and empathic toward their inhabitants. “Smart” responsive architecture is rapidly transforming our built environments, but it is fraught with problems including sustainability, data privacy, and privatized infrastructure. These concerns need conceptual and technical analysis so that designers, urban developers and architects can work positively within this deeply influential new field.[1] The Living Architecture Systems Group is developing tools and conceptual frameworks for examining materials, forms, and topologies, seeking sustainable, flexible, and durable working models of living architecture.

A series of far-reaching critical questions can be explored by using the tools and frameworks that are described within this specialized publication series: can the buildings that we live in come alive? Could living buildings create a sustainable future with adaptive structures while empathizing and inspiring us? These questions can help redefine architecture with new, lightweight physical structures, embedded sentient and responsive systems, and mutual relationships for occupant that provide tools and frameworks to support the emerging field of living architecture. The objective of this integrated work envisions embodied environments that can provide tangible examples in order to shift architecture away from static and inflexible forms towards spaces that can move, respond, learn, and exchange,[2] becoming adaptive and empathic toward their inhabitants.[3]

1 Kas Oosterhuis and Xin Xia, *iA #1, Interactive Architecture* (Rotterdam: Episode Publishers, 2007); Nicholas Negroponte, *Being Digital* (New York: Vintage Books, 1995); Lucy Bullivant, *4dsocial: Interactive Design Environments* (London: AD/John Wiley & Sons, 2007); Neil Spiller, *Digital Architecture Now: A Global Survey of Emerging Talent* (London: Thames & Hudson, 2009). Michael Fox and Miles Kemp, *Interactive Architecture* (Princeton: Princeton Architectural Press, 2009).

2 For example the Living Architecture (LIAR) next-generation, selectively programmable bioreactor developed by LASG Metabolism Stream Lead Rachel Armstrong, Newcastle, uses microbial processes to generate electricity, oxygen, fertiliser, and other life-sustaining outputs from waste (carbon dioxide, grey water) that would otherwise be ejected from a building: “Living Architecture LIAR,” accessed February 2, 2022, https://livingarchitecture-h2020.eu/.

3 Bullivant, *4dsocial.*

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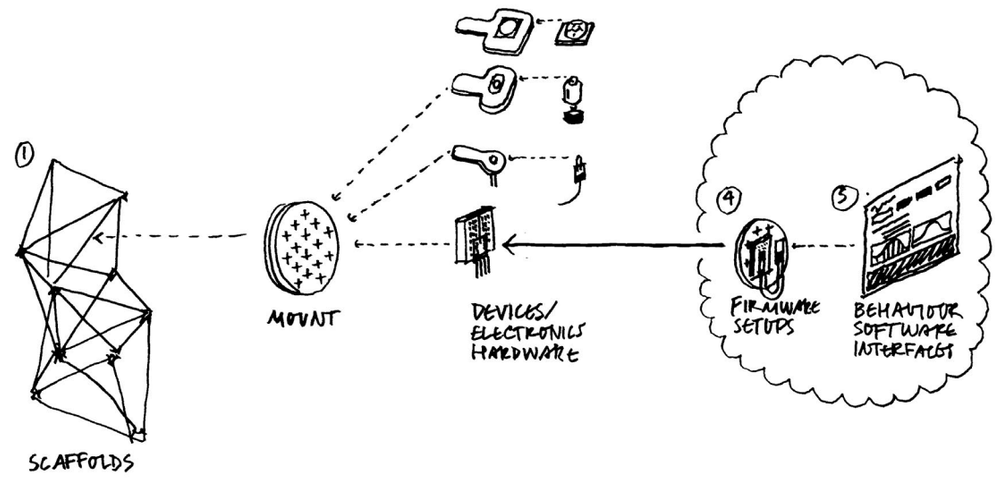
Introduction



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Smart Cell System conceptual integration diagram, LASG/PBSI

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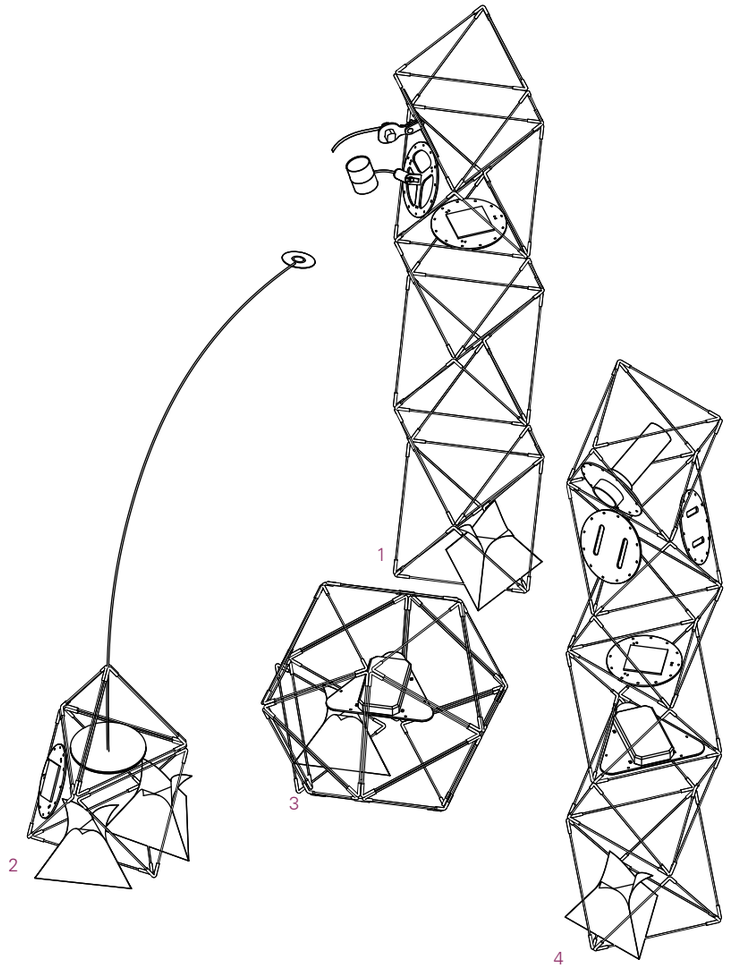
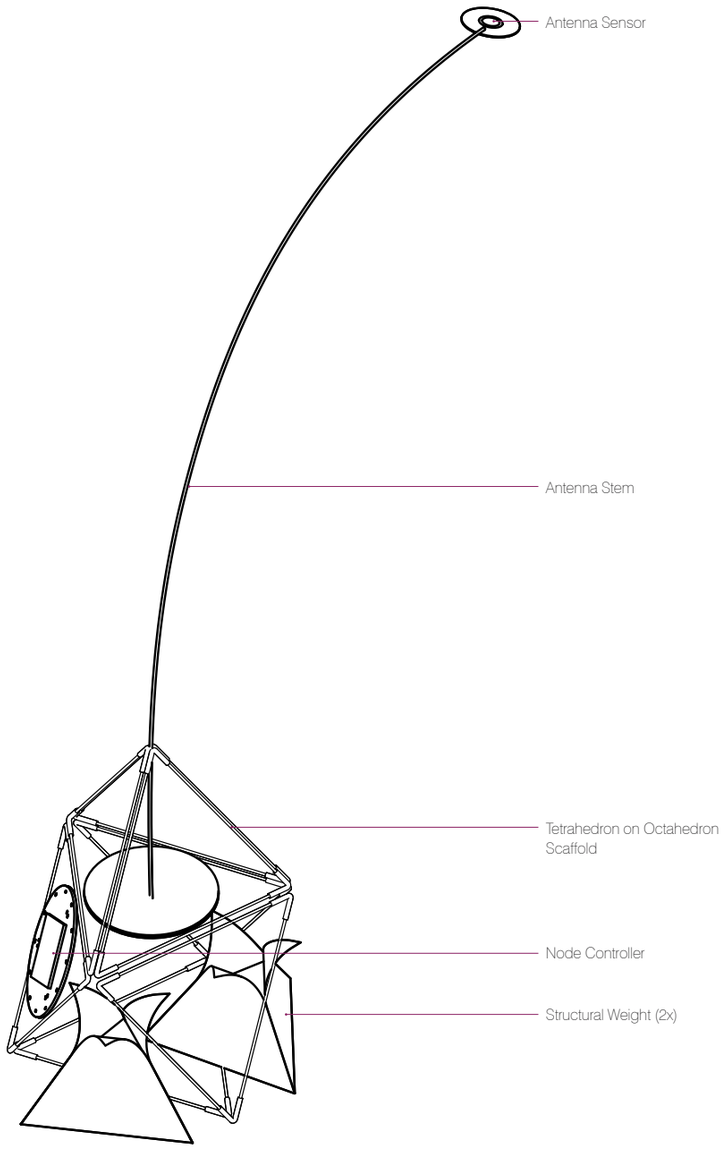
Creative Commons open-source licensing permits non-commercial adaptation and extension of the patterns illustrated here.

Interactive Soundscapes

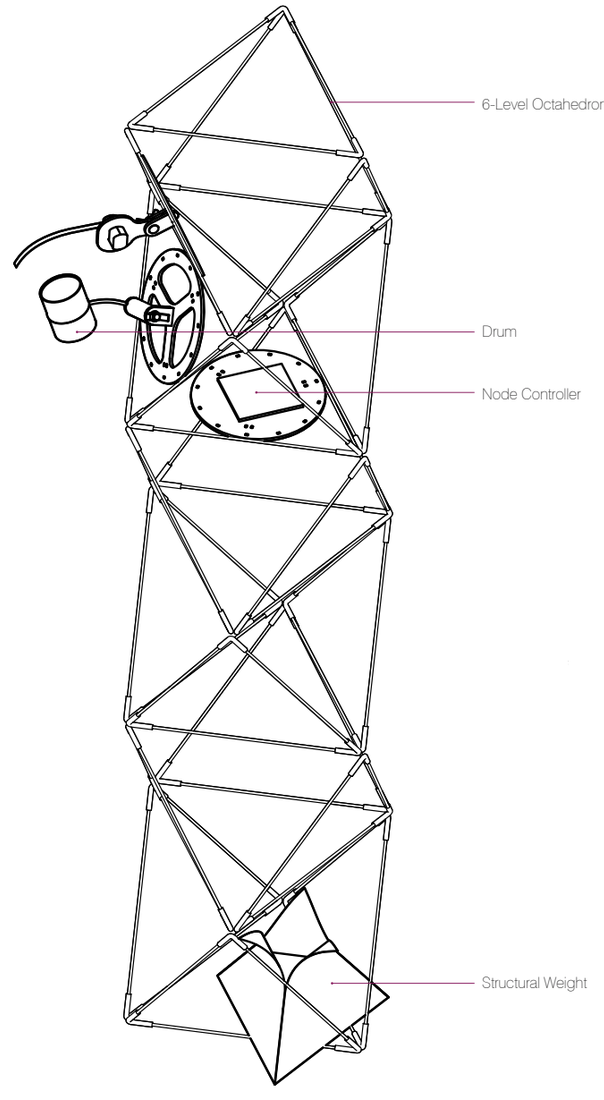


Soundscape Group Assembly Types

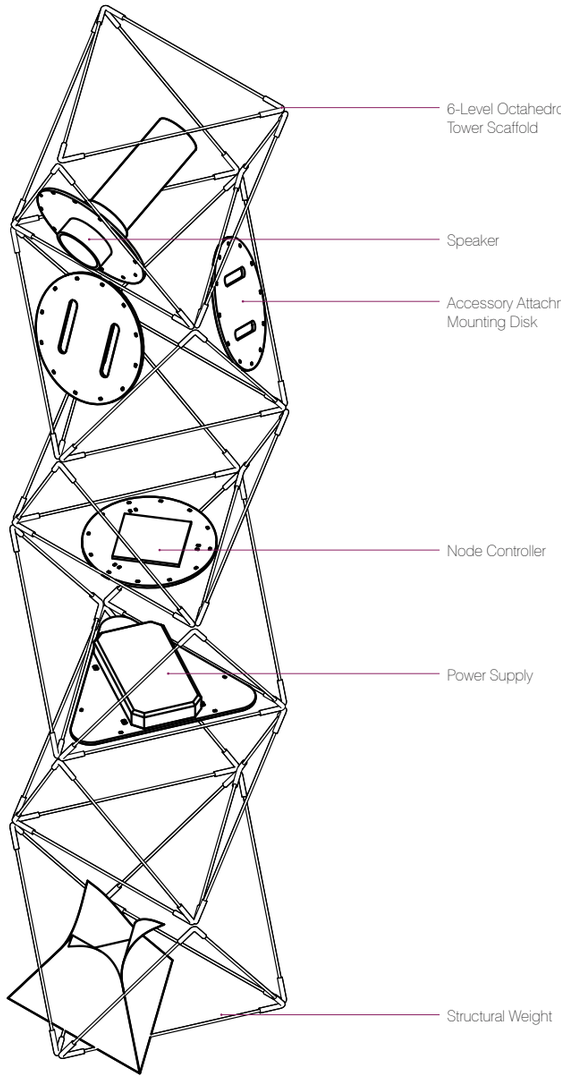
1 Drumming Tower Assembly
2 Antenna Assembly
3 Power Node Assembly
4 Sound Tower Assembly



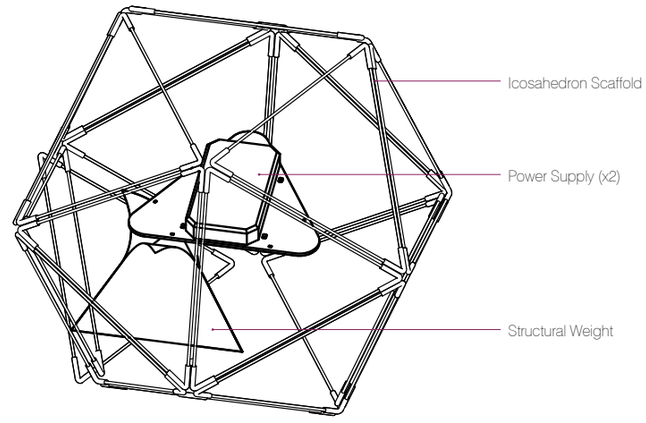
Antenna Assembly



Drum Tower Assembly



Sound Tower Assembly

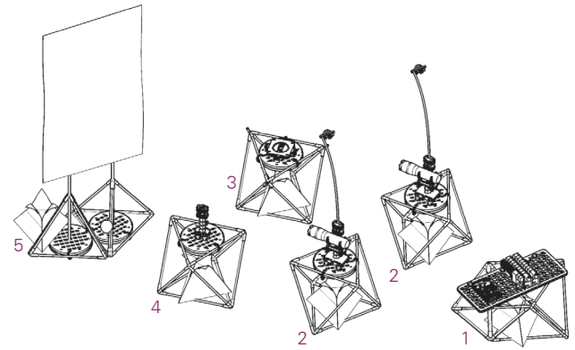


Power Node Assembly

Sound and Shadow Performance

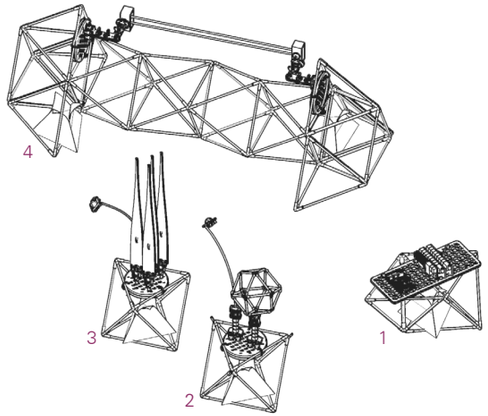
Light Group

1 Electronics Assembly Type A
2 Flashlight Assembly (x2)
3 Turntable Assembly
4 Crystal Assembly
5 Projector Screen Assembly



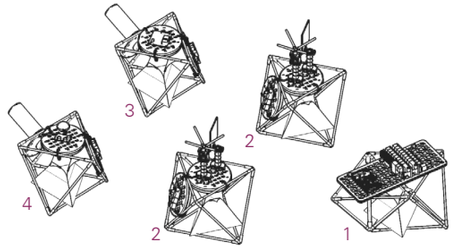
Motion Group

1 Electronics Assembly Type A
2 Shape on Servo Assembly
3 Blade of Grass Assembly
4 Clothesline Assembly



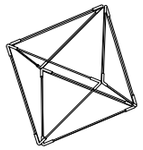
Sound Group

1 Electronics Assembly Type B
2 Rotating Clicker Assembly (x2)
3 Sound Sampler WAV Assembly
4 Voice Recorder Assembly



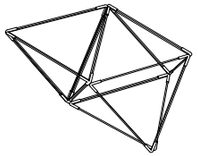
Scaffold Type A

Pyramid Unit



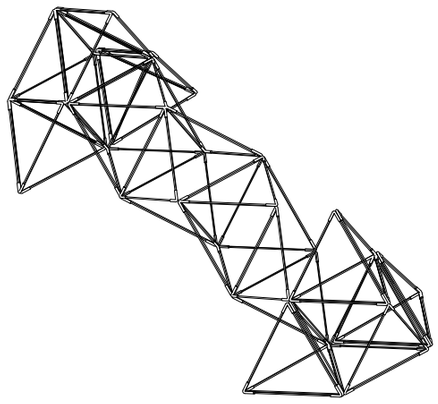
Scaffold Type B

Octahedron Unit



Scaffold Type C

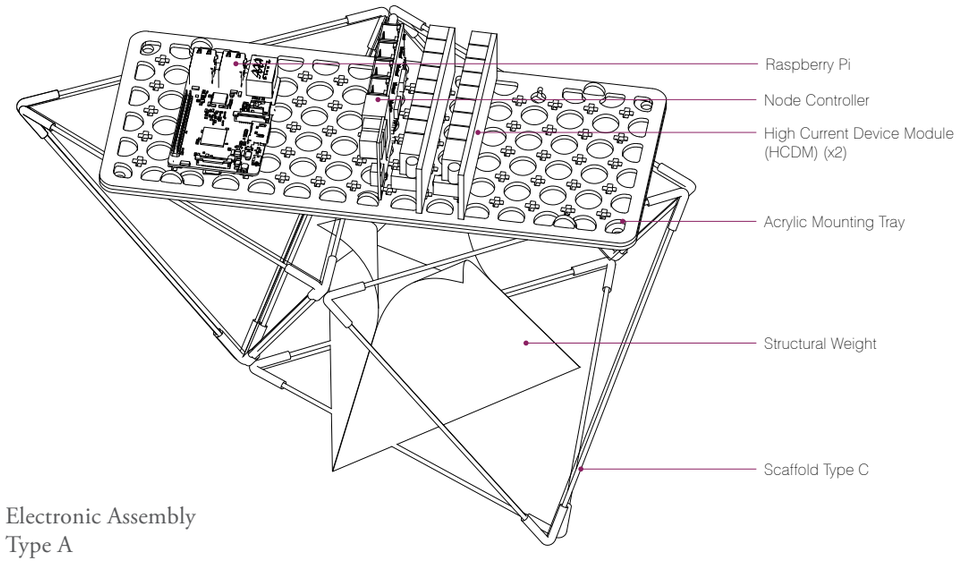
Octahedron with Pyramid Extension



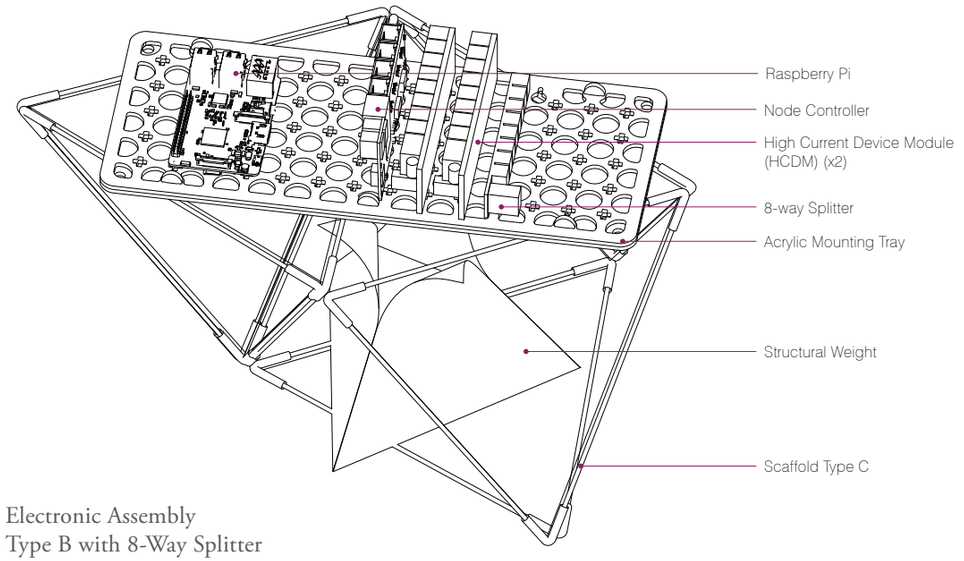
Scaffold Type D

Space Truss Tower with Stabilizing Sleds

Assembly Scaffold Types

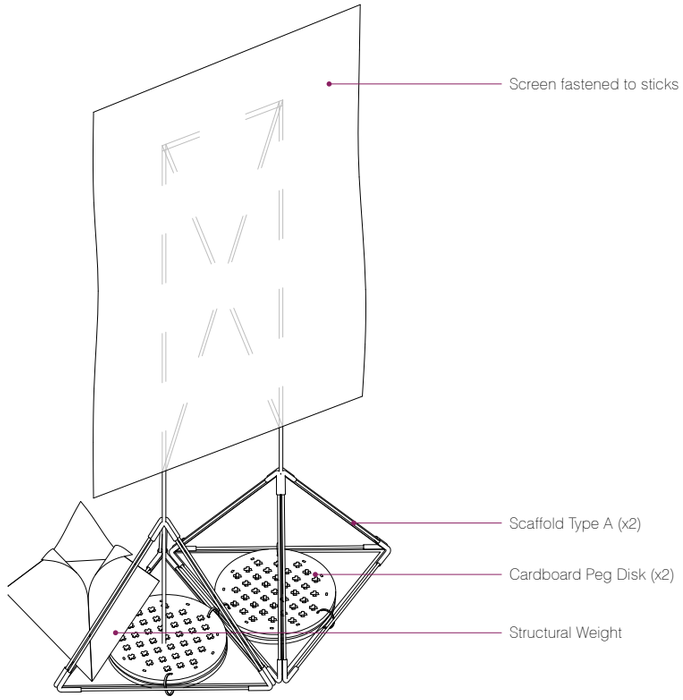


Electronic Assembly
Type A

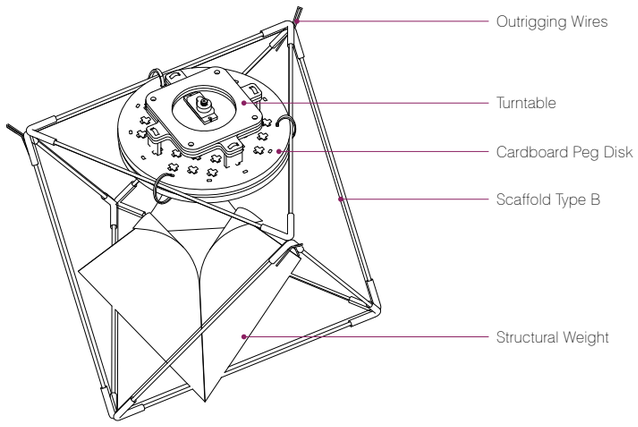


Electronic Assembly
Type B with 8-Way Splitter

Electronics Assembly Types

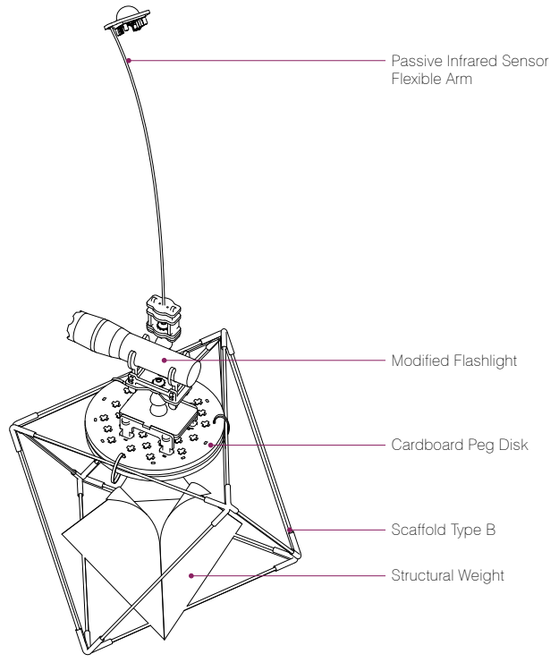


Projector Screen Assembly

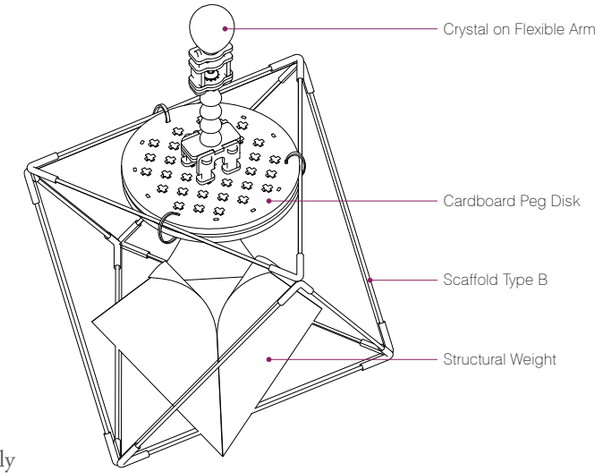


Turntable Assembly

Light Group Assemblies

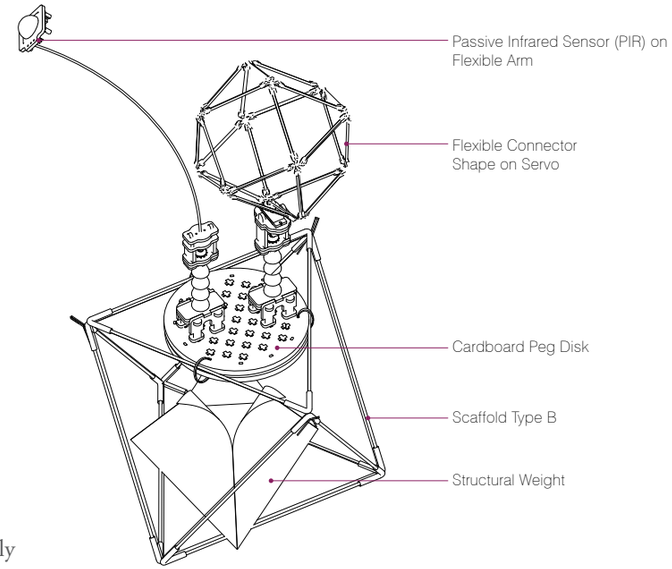


Flashlight Assembly

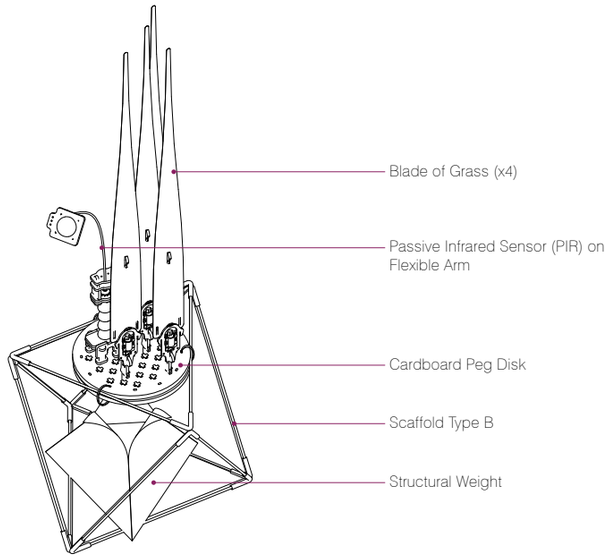


Crystal Assembly

Light Group Assemblies

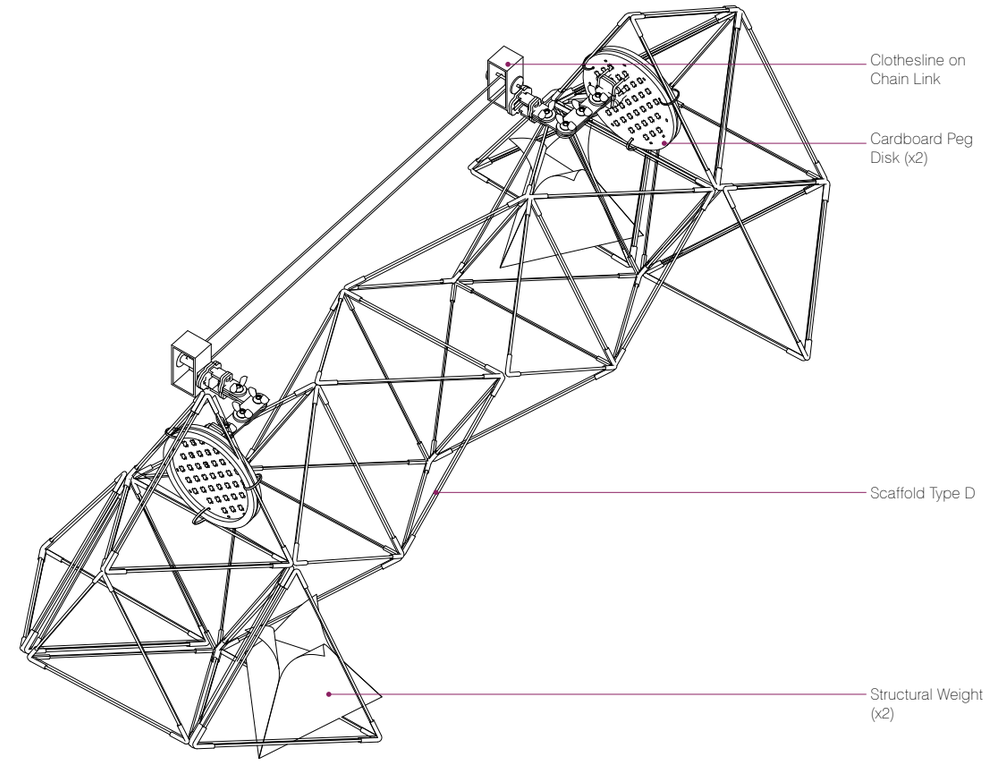


Shape on Servo Assembly



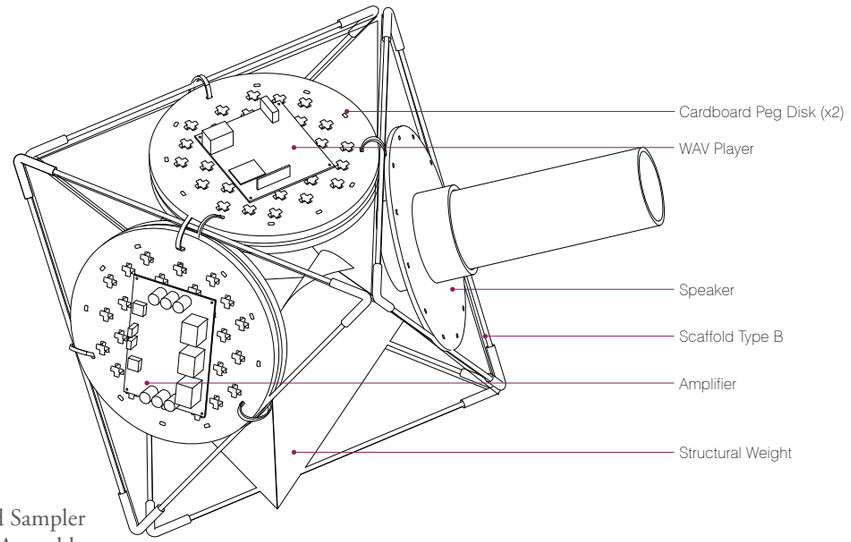
Blade of Grass Assembly

Motion Group Assemblies



Clothesline Assembly

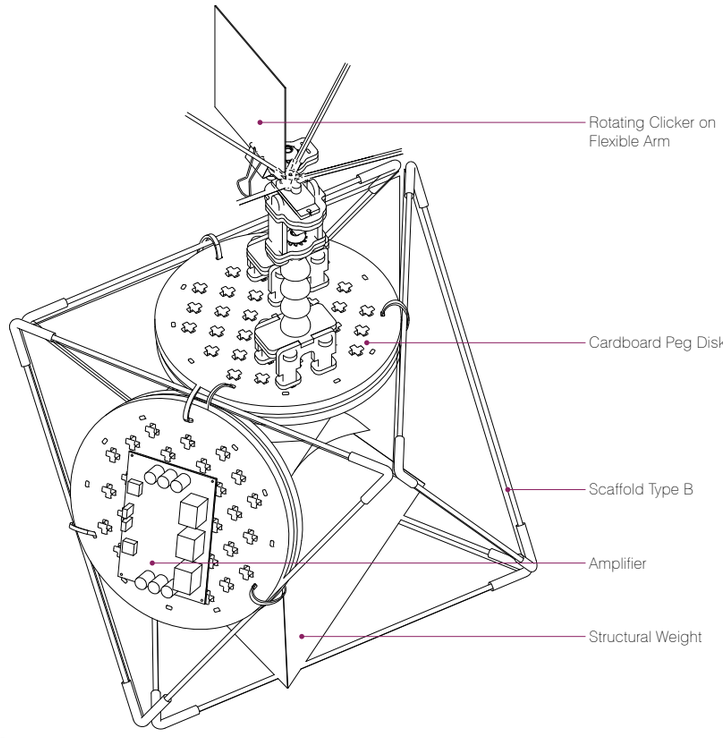
Motion Group Assemblies



Sound Sampler
WAV Assembly

Voice Recorder
Assembly

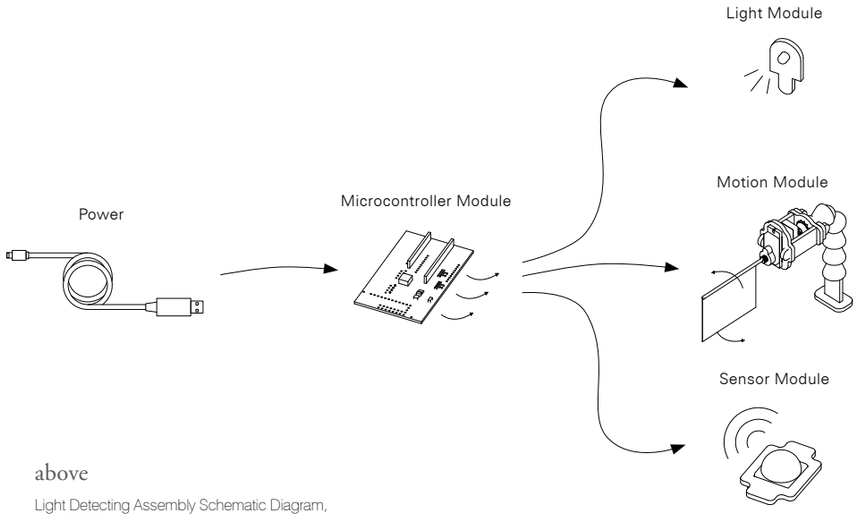
Sound Group Assemblies



Rotating Clicker Module

Sound Group Assemblies

Interactive Array Exploration



above

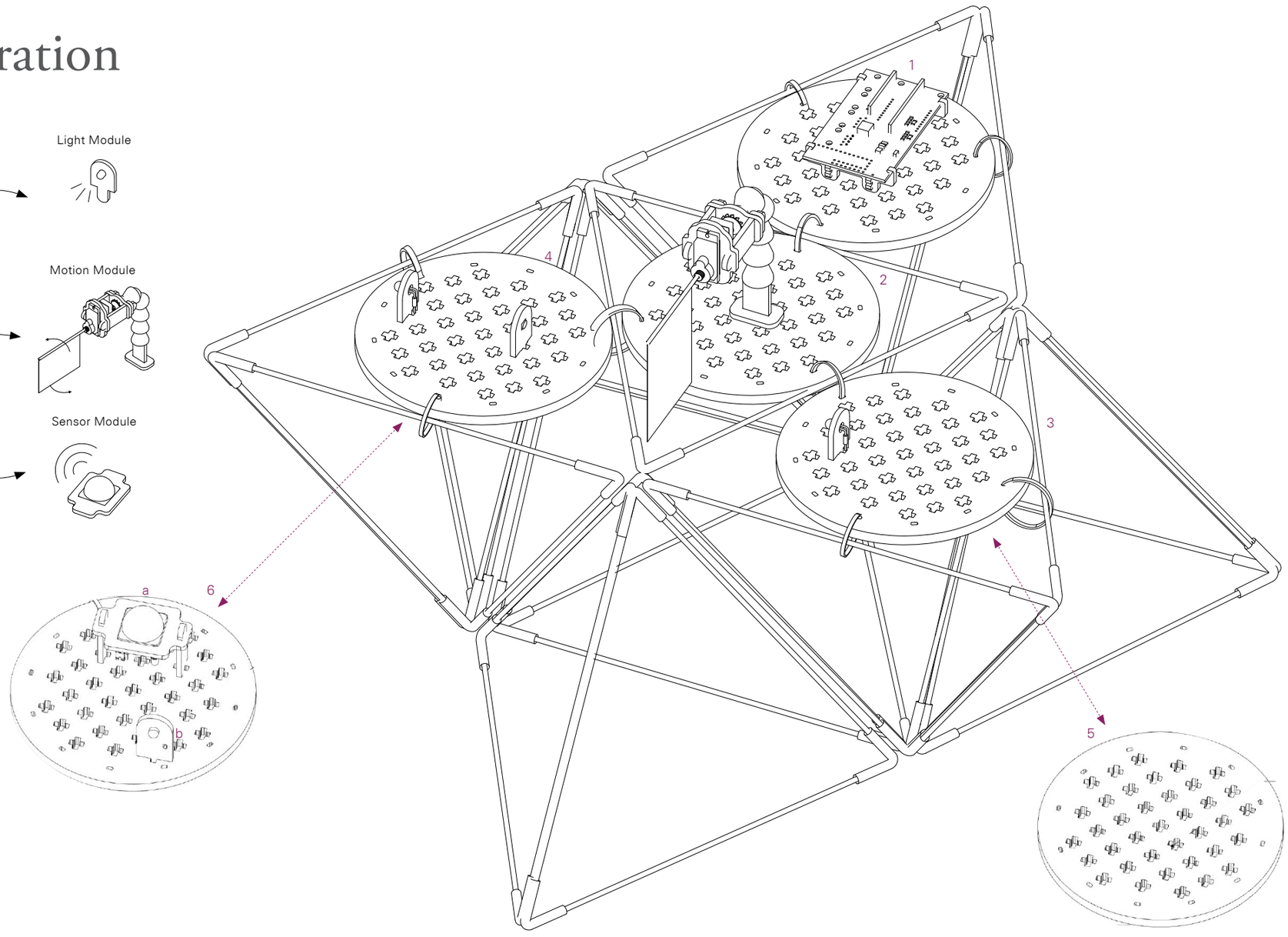
Light Detecting Assembly Schematic Diagram, LASG/PBSI

Light Detecting Assembly

1 Node Controller Module
2 Rotating Arm Module
3 Light Module
4 Light Sensor Module

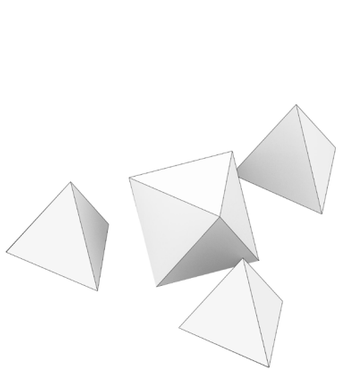
Variation: Motion Detecting Assembly

5 Change Light Module into an Empty Module by Taking Out the Indicator LED
6 Change Light Sensor Module with Motion Sensor Module by Replacing Photoresistor with PIR Sensor
a PIR Sensor
b Indicator LED



Truncated Tetrahedron Unit x1

Pyramid Unit x6



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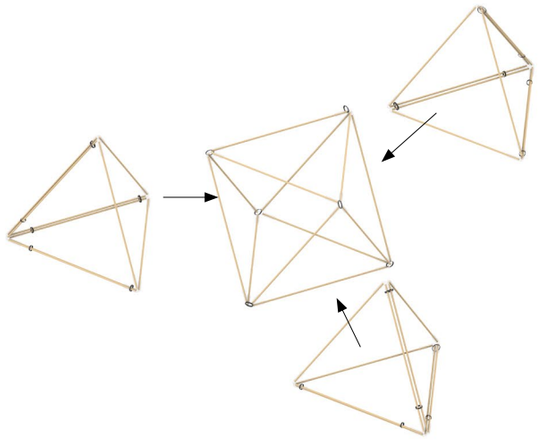

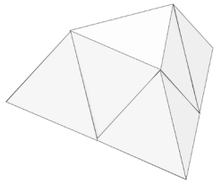

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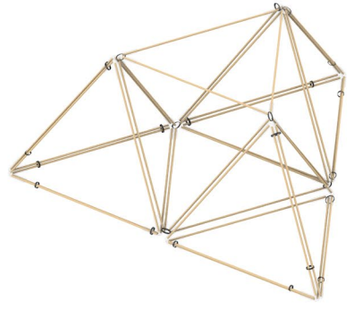
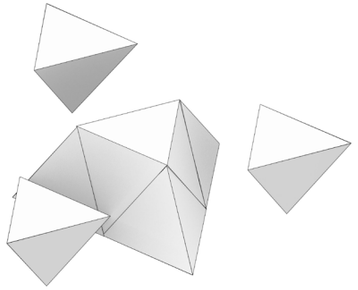


Scaffold Assembly



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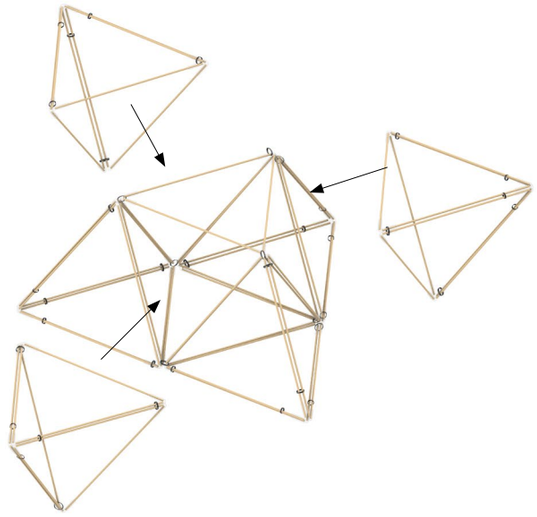

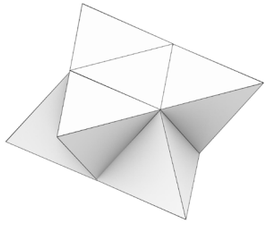

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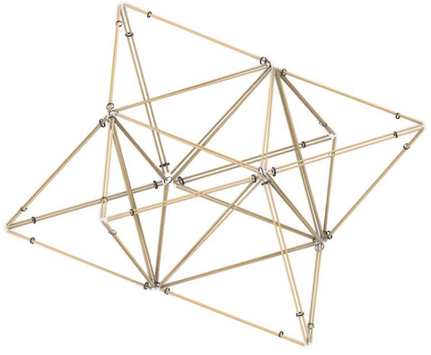
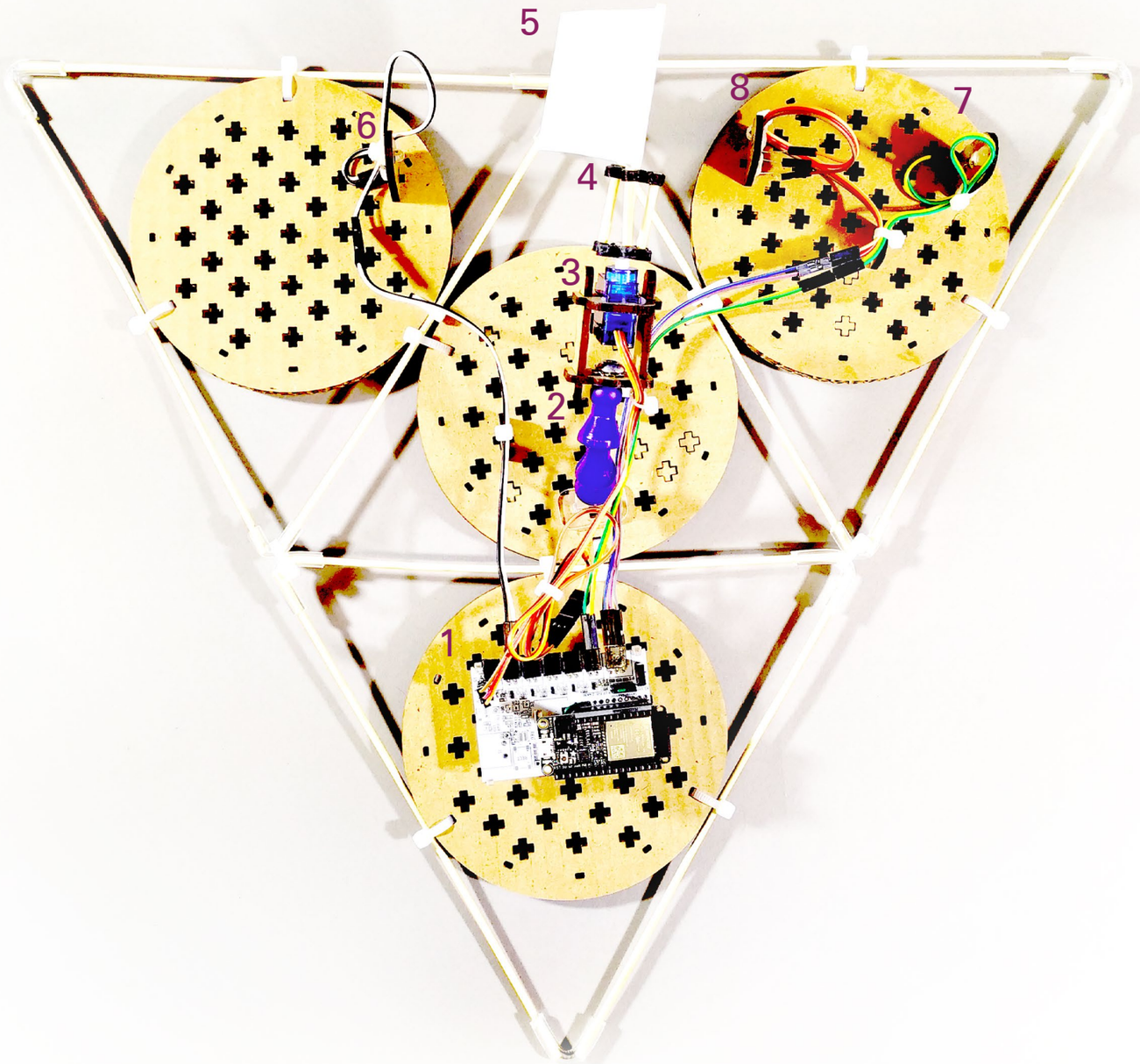
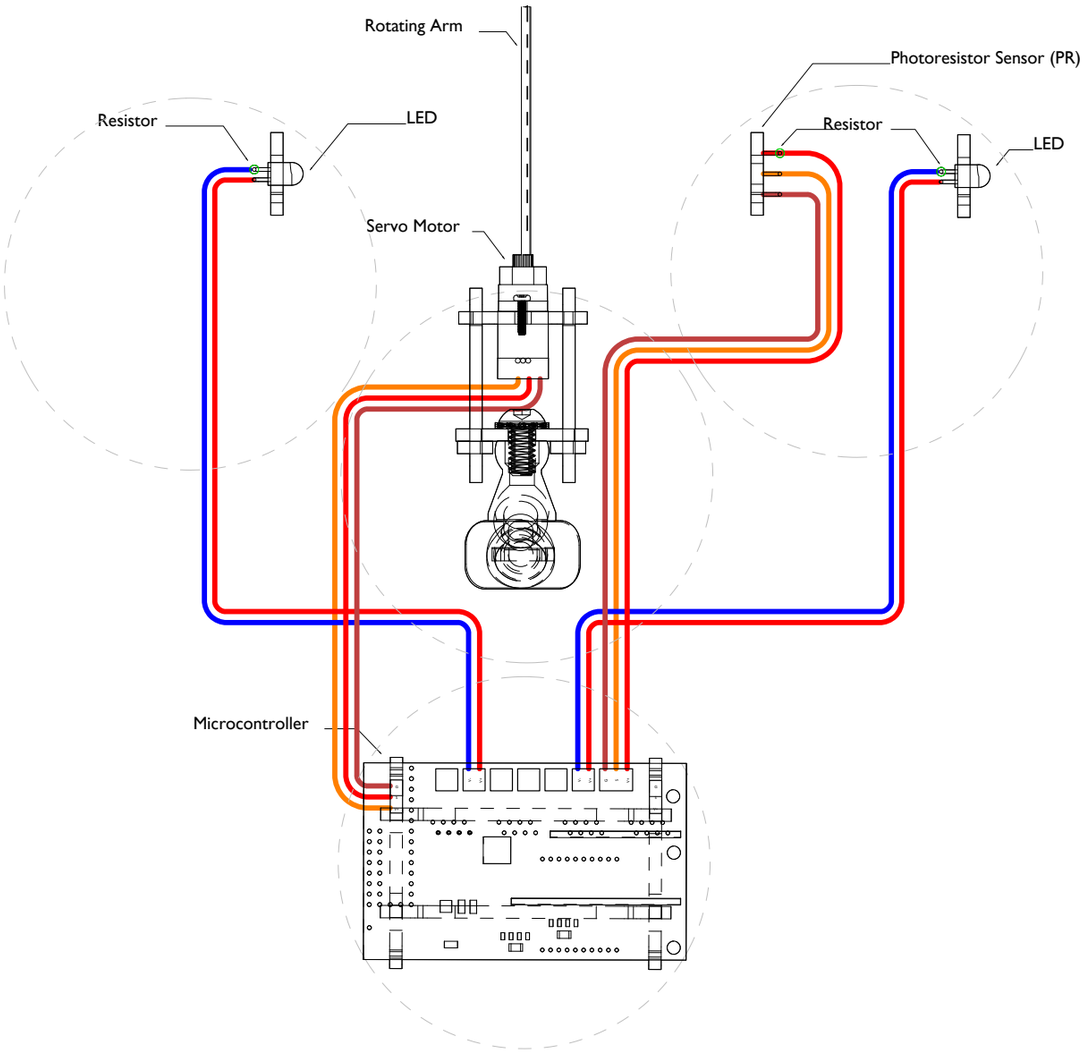


Scaffold Assembly

Light Detecting Assembly

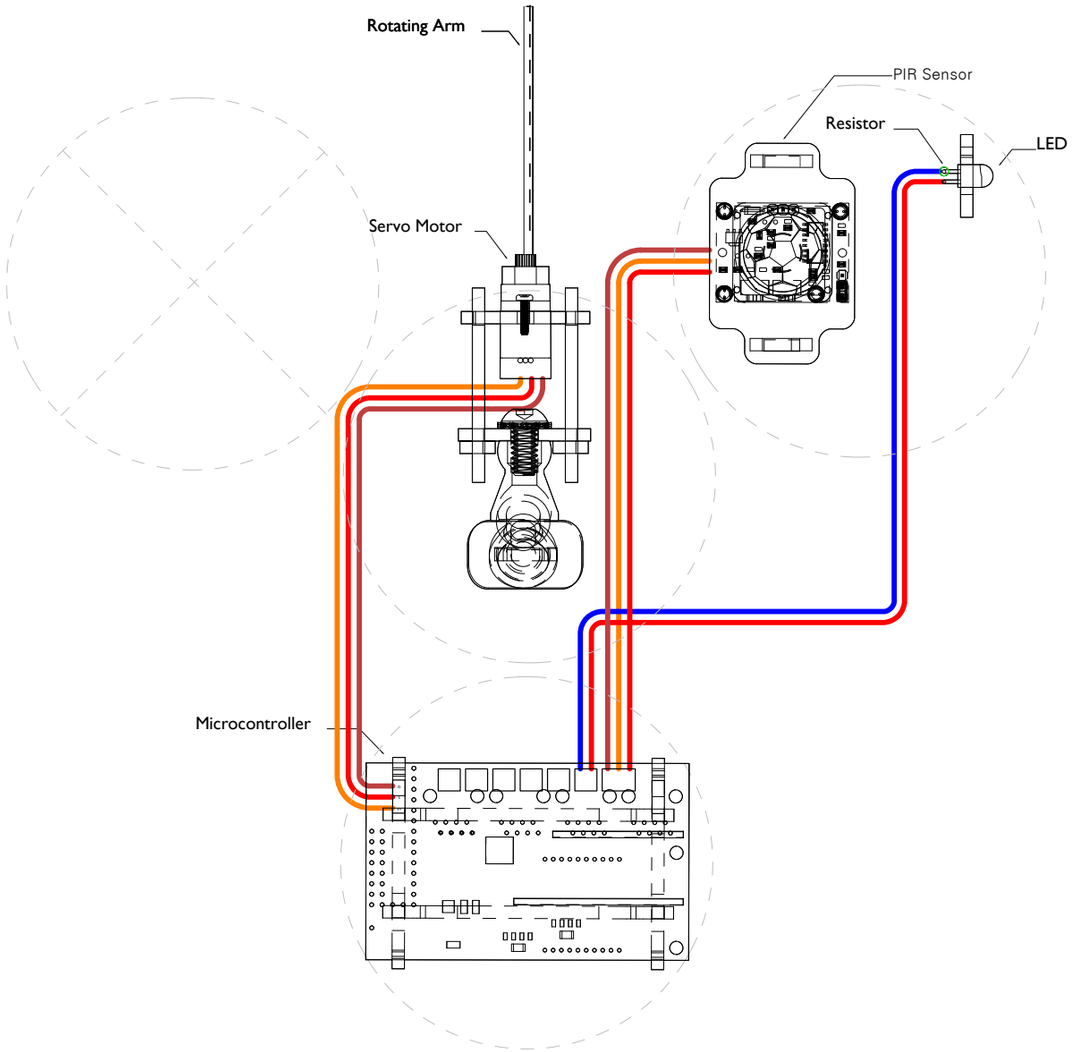
1 Node Controller on Acrylic Sled
2 Flexible Arm on Acrylic Mount
3 Servo Bolted to Mounting Plate
4 Bamboo Truss Tower
5 Paper Sheet
6 LED on Peg Mount
7 Indicator LED on Peg Mount
8 Photoresistor on Peg Mount





Light Detecting Assembly Cable Connections

V+ SIG GND V-



Variation: Motion Detecting Assembly Cable Connections

V+ SIG GND V-

References

Bullivant, Lucy. *4dsocial: Interactive Design Environments*. London: AD/John Wiley & Sons, 2007.

Fox, Michael and Miles Kemp. *Interactive Architecture*. Princeton: Princeton Architectural Press, 2009.

"Living Architecture LIAR," accessed February 2, 2022, https://livingarchitecture-h2020.eu/.

Nicholas Negroponte, *Being Digital*. New York: Vintage Books, 1995.

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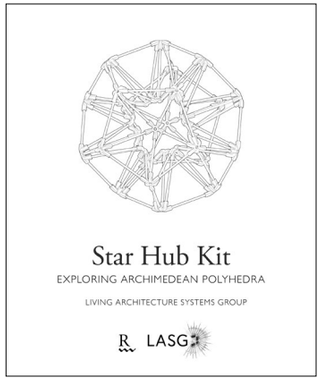

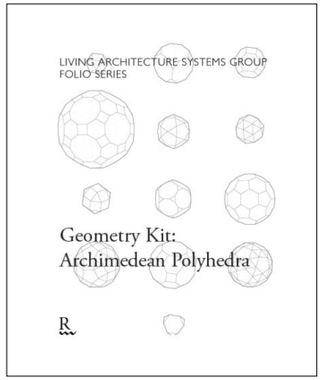

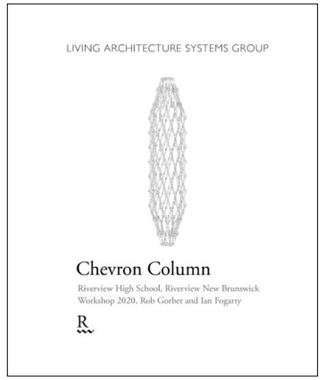

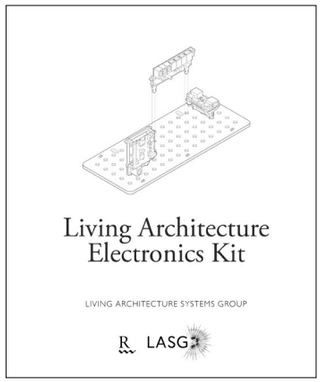

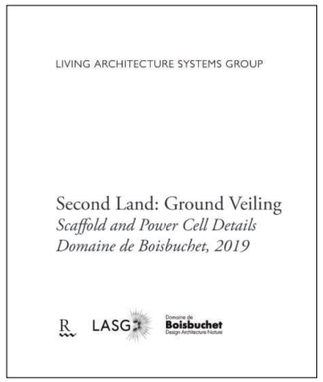

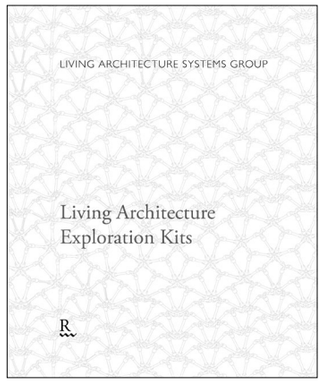

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Michael Lancaster
Matt Gorbet
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