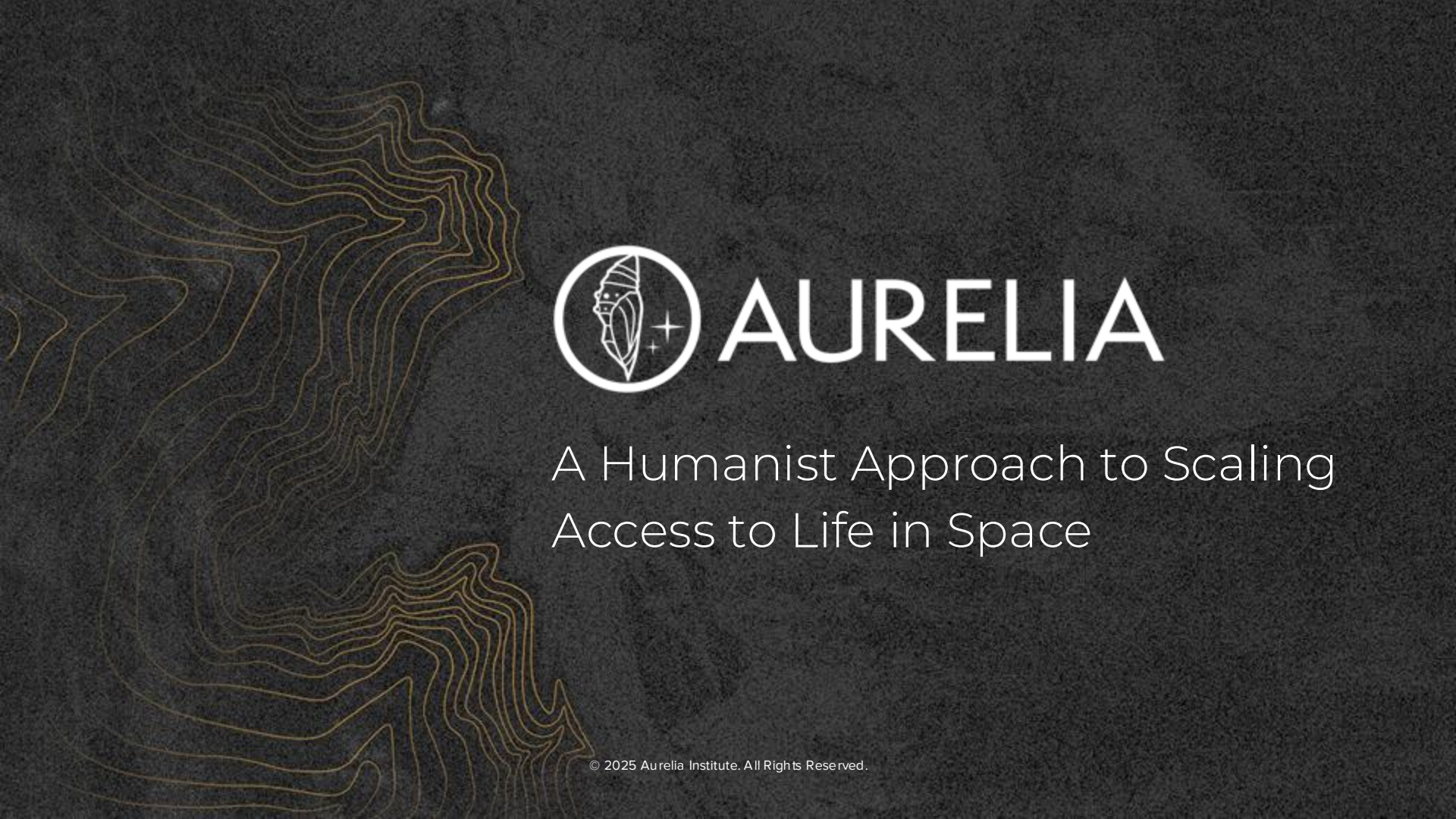


A Humanist Approach to Scaling Access to Life in Space

Aurelia Institute is a nonprofit space architecture R&D lab, education and outreach center, and policy hub dedicated to building humanity's future in space.

Aurelia Institute is:

A space architecture incubator

A new point of access for "life in space" research as we build Starfleet Academy

Building a better vision for humanity everywhere — on Earth, in orbit, or beyond — through cross-over technology and policy for extreme environments

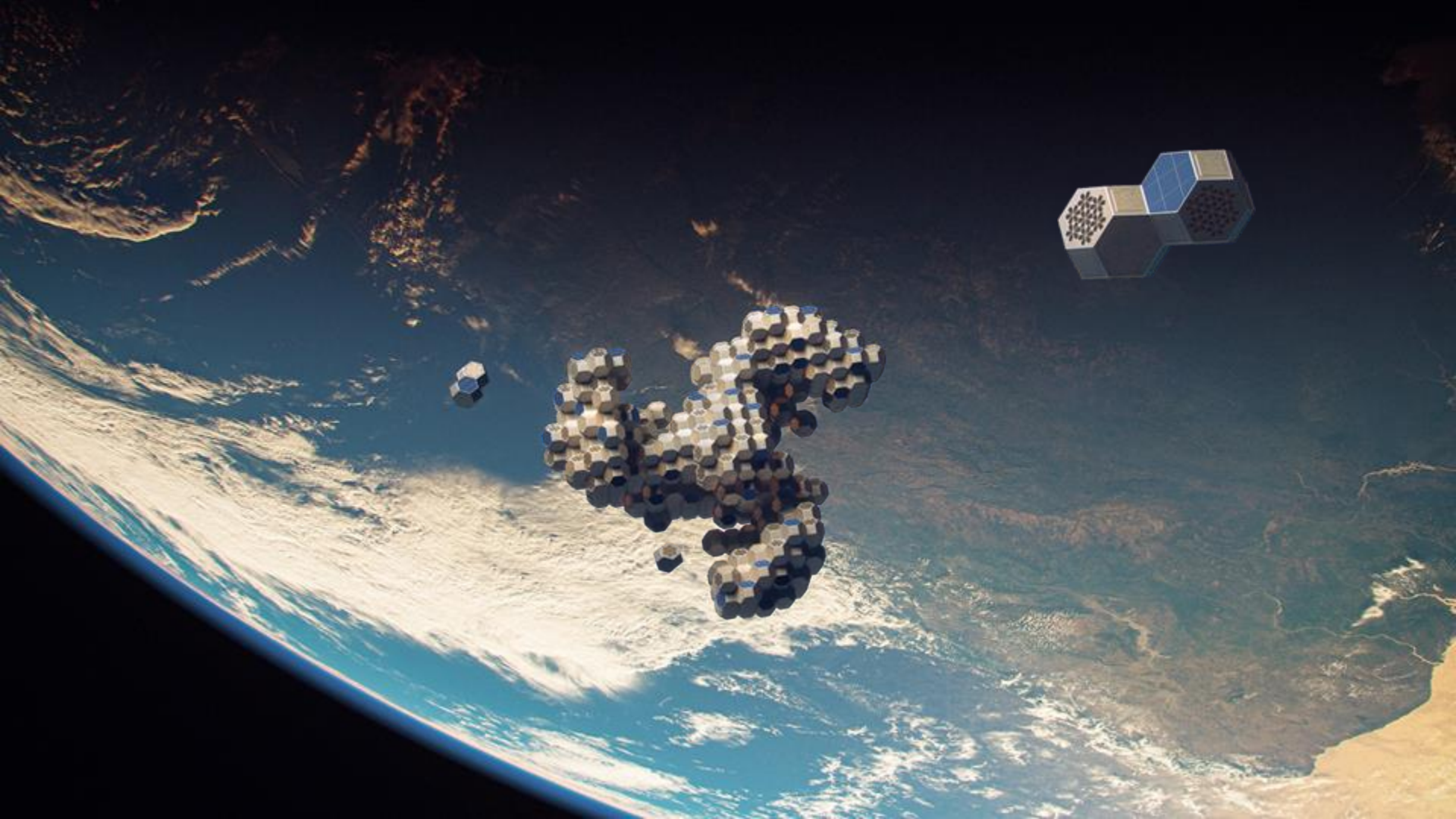
About Me

Previously:

- Aero/Astro @ MIT
- MS/PhD @ CU Boulder
- NASA HOME Project
- Formulation & Juno Ops @ NASA JPL
- New Glenn GNC @ Blue Origin

Currently:

- VP of Engineering @ Aurelia Institute



PROJECT

TESSERAE

TESSERAE

Tessellated **E**lectromagnetic **S**pace **S**tructures for the **E**xploration of **R**econfigurable, **A**daptive **E**nvironments

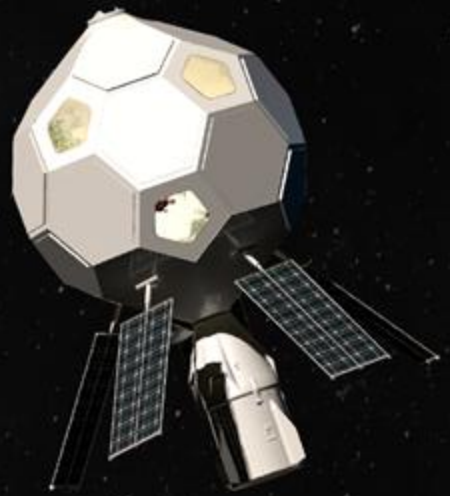
Inspired by nature’s patterns of self-assembly, TESSERAE uses electropermanent magnets and state-based control to enable autonomous in-space construction.

PROJECT

TESSERAE Applications

- Space habitats
- Space-based solar arrays
- Parabolic reflectors
- Deployable radiators
- Asset shielding

…anything you want to build in space that can’t fit in a fairing!

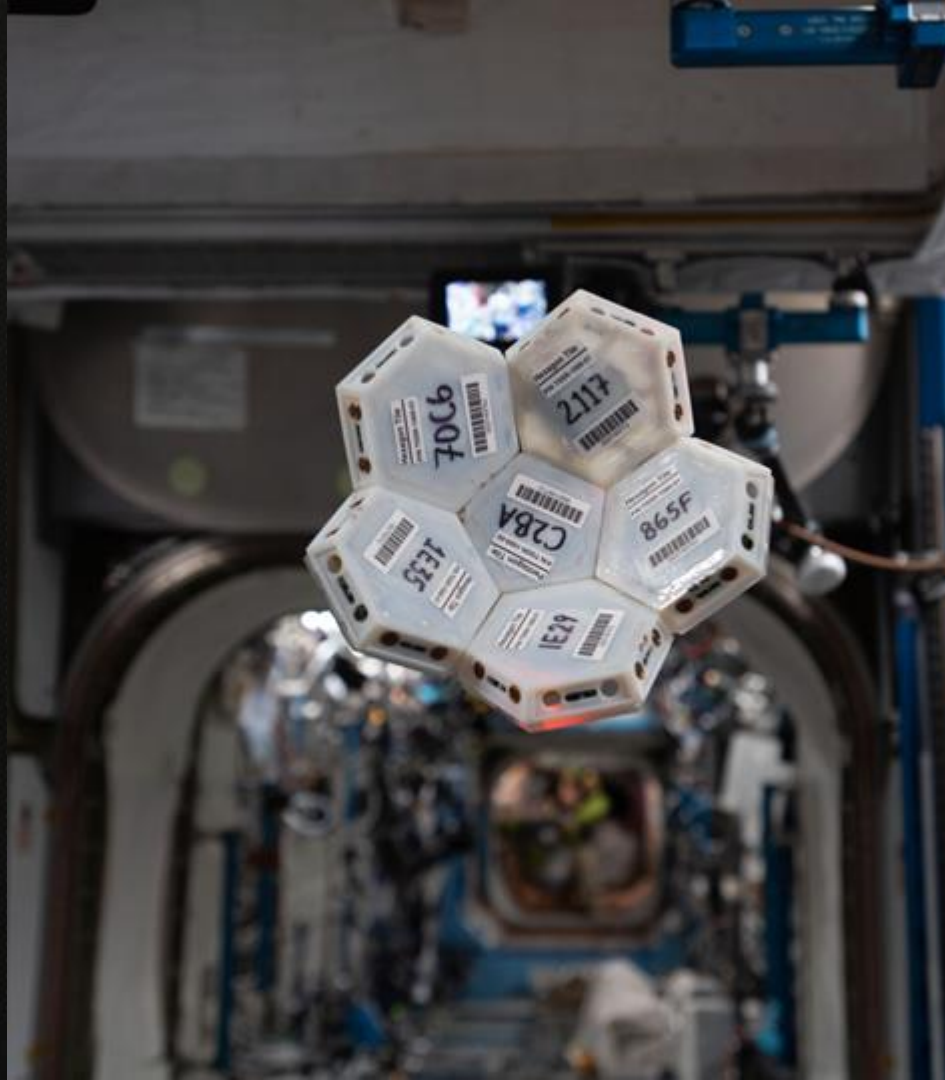


PROJECT

TESSERAE

Concept of Operations

- 32 tiles
- 20 hexagons and 12 pentagons
- Launched in an unconfigured stack
- Baseline ‘buckyball’ shape (truncated icosahedron) for large volume/surface
- Quasi-stochastic self-assembly
- Assembly time on the order of hours

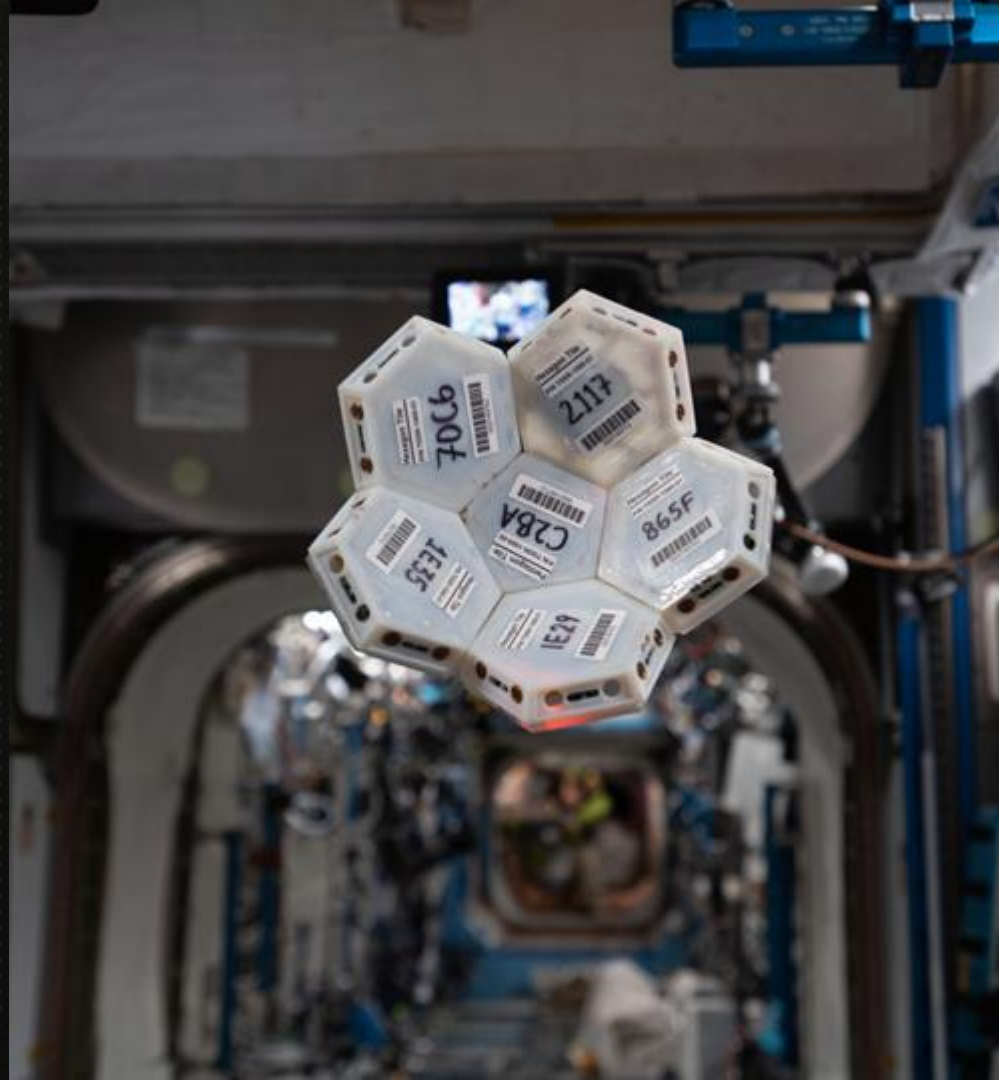


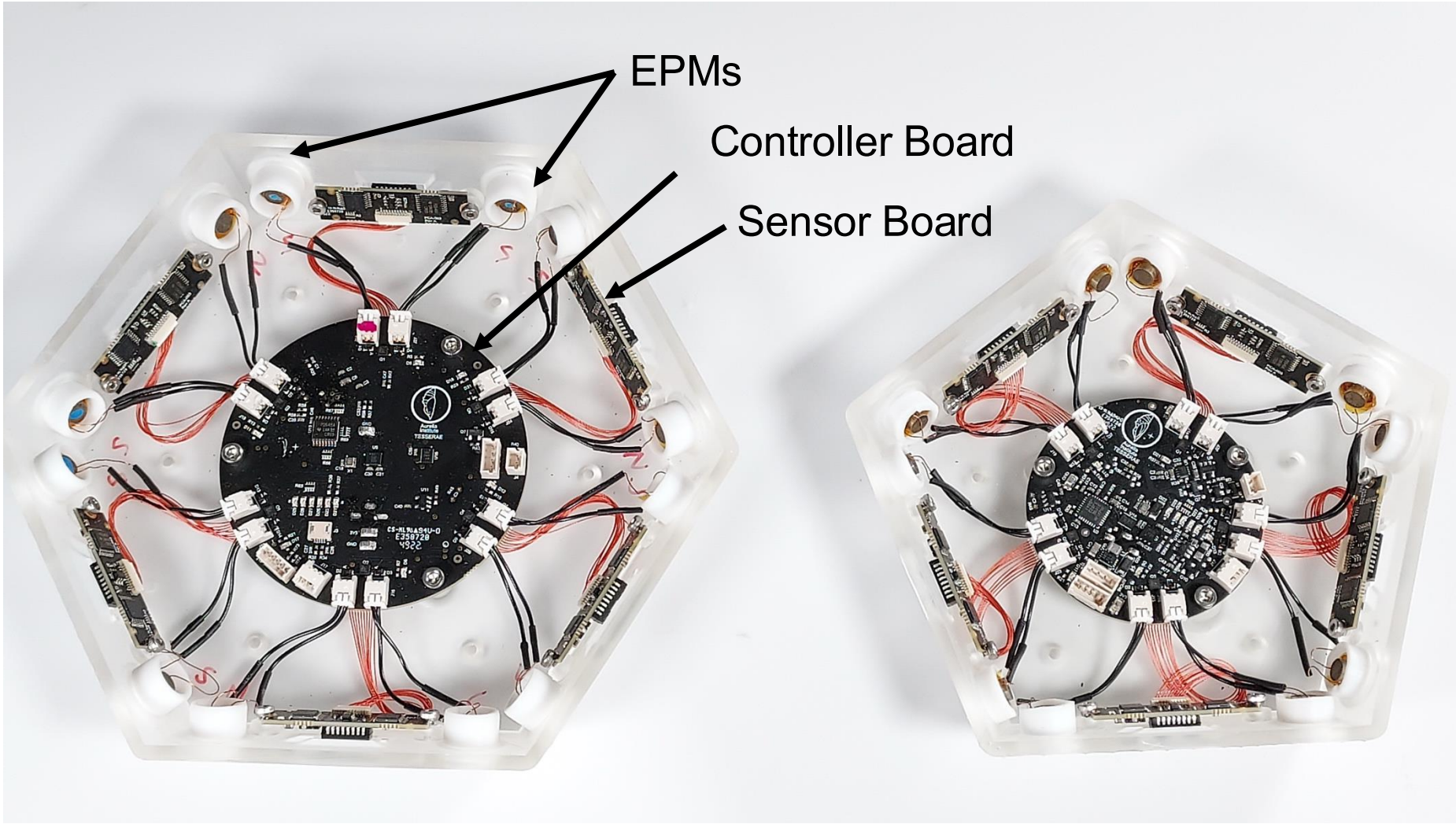
PROJECT

TESSERAE

Key components

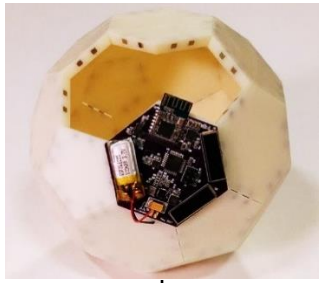
- Electropermanent magnets (EPMs)
- IMUs
- Magnetometers
- Camera (new to gen 5!)




EPMs
Controller Board
Sensor Board

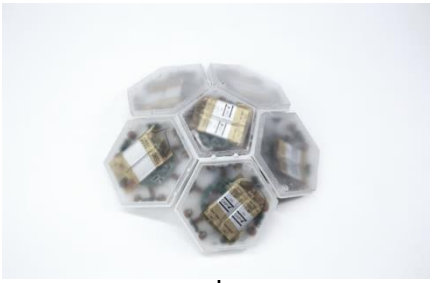
TESSERAE hardware & test campaigns

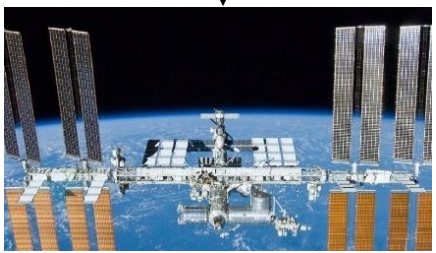
1st Gen (2017)



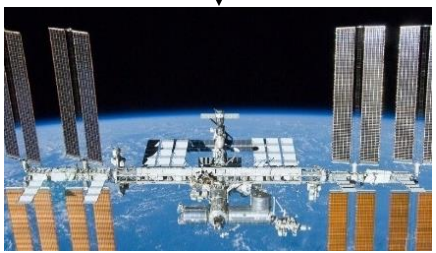
2nd Gen (2019)

3rd & 4th Gen (2020/2022)





5th Gen (2025)



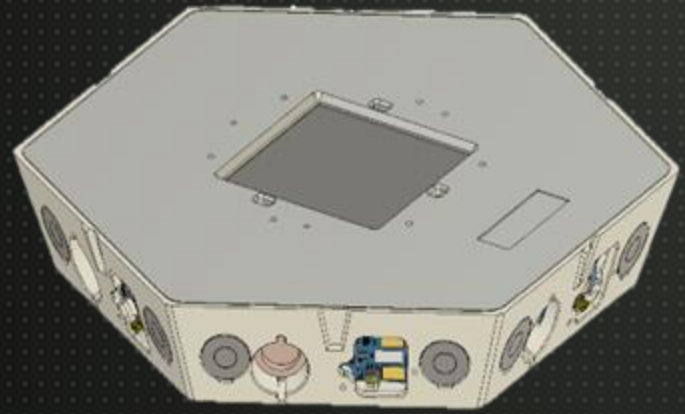

TESSERAE tech has been tested twice in orbit…

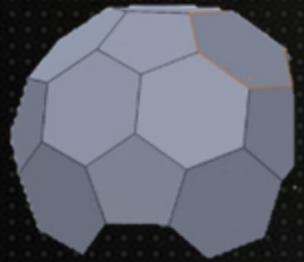
...and is returning to ISS in spring 2026!

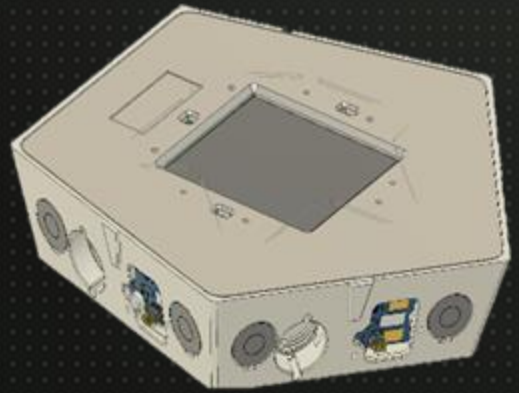
PROJECT

TESSERAE

- Goal of demonstrating **full buckyball assembly**
- Week long demonstration in aisle way
- Key upgrades
  - Machine vision (AprilTags)
  - Dispenser
  - Containment system

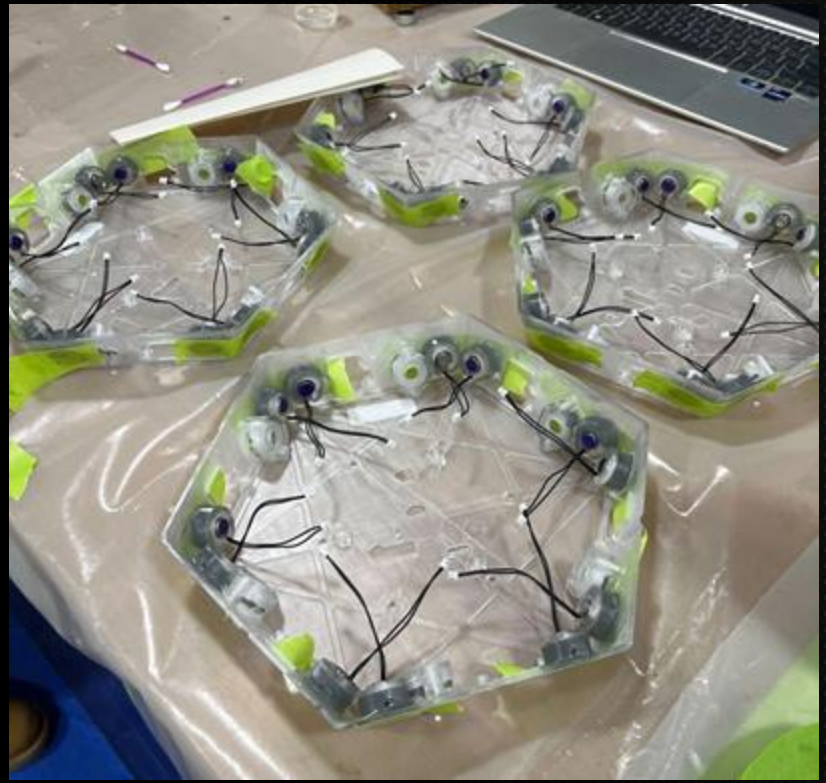






PROJECT

TESSERAE Gen 5



PROJECT

TESSERAE

Lessons Learned

- Minimize complexity
- Importance of graduate interns
- Procure early
- Test incrementally
- Test Creatively
  - String tests
  - Air bearing tables
  - Zero G!
- Test everything

Come join us, and design the next generation of space architecture as we venture beyond humanity's cradle!

AureliaInstitute.org

Hello@AureliaInstitute.org

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