

TENSEGRITY ROBOTICS

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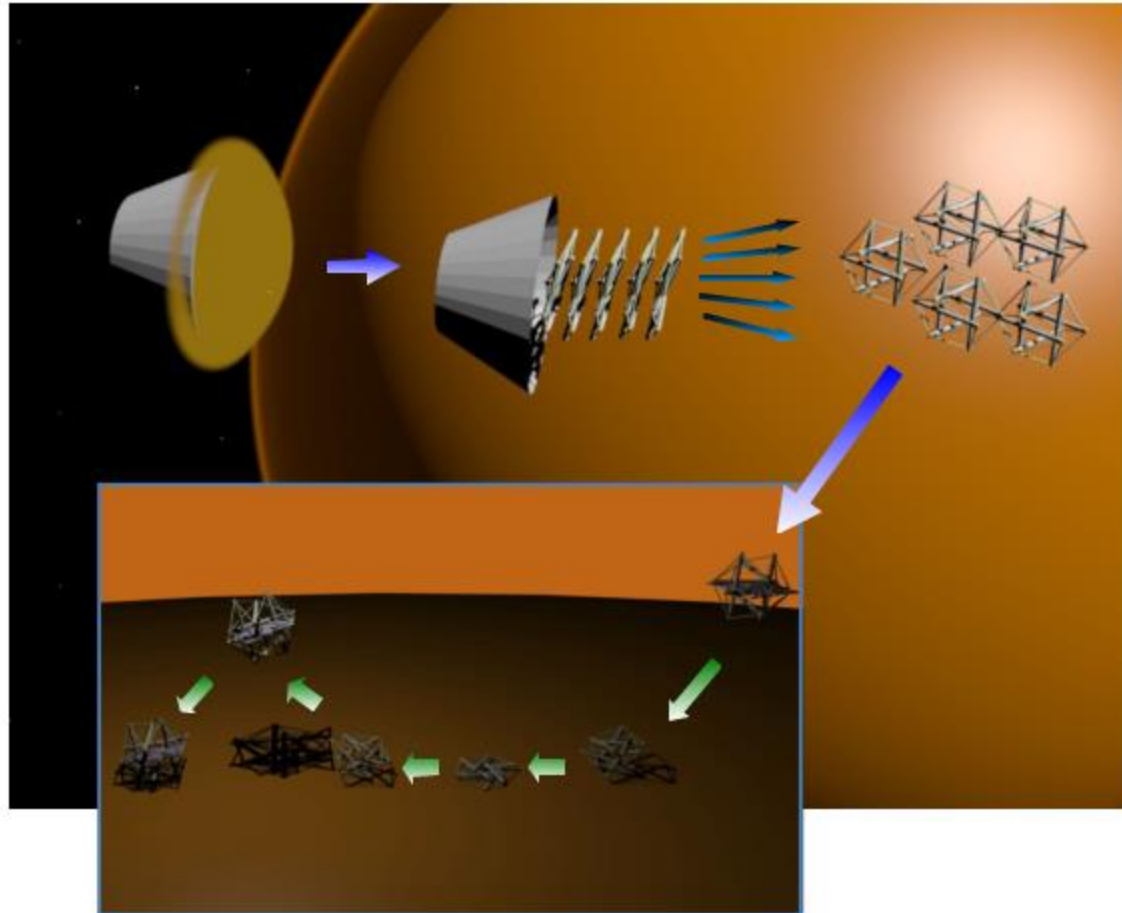
8-21-2015

University of California, Berkeley

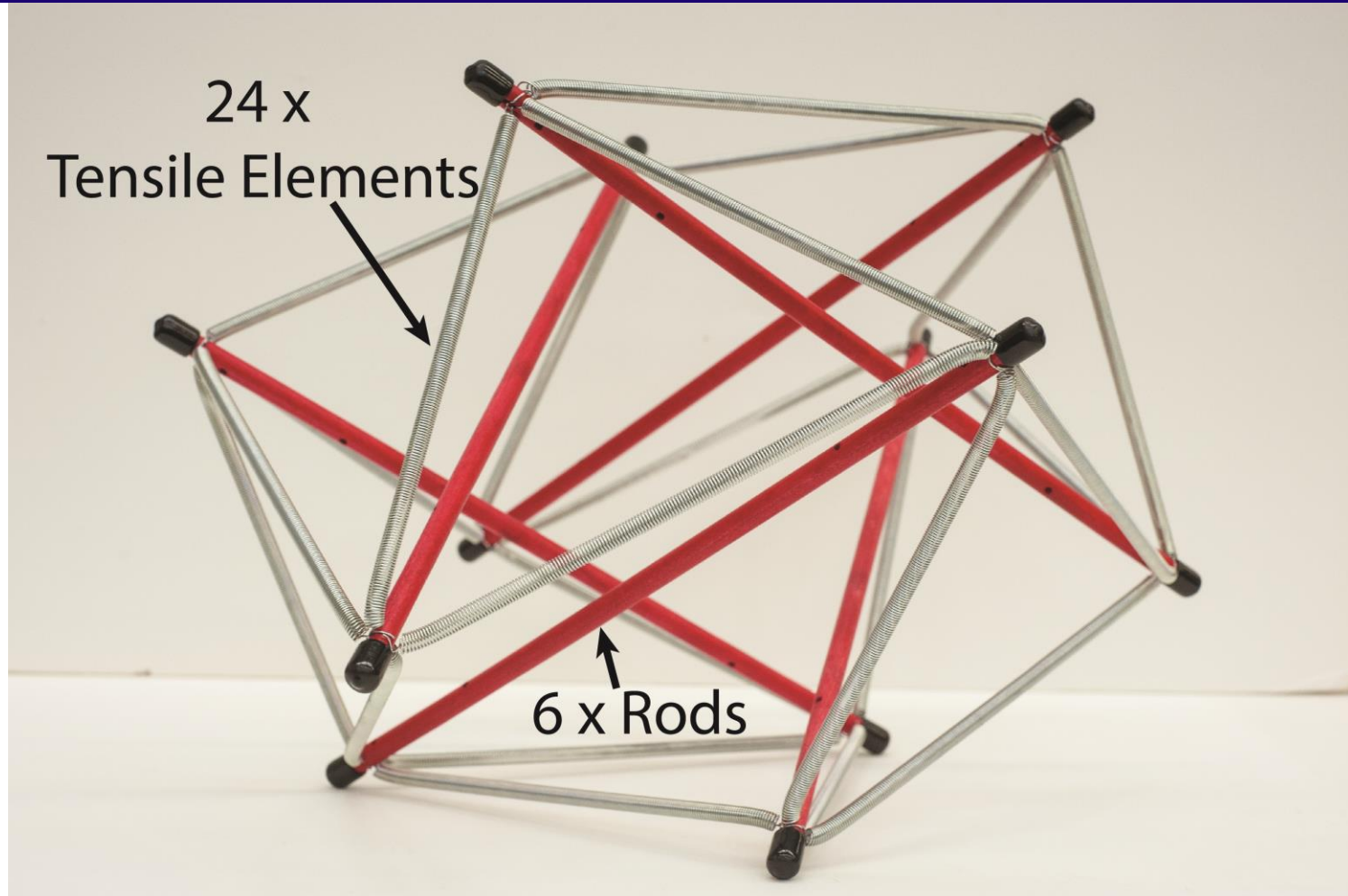
Department of Mechanical Engineering

Berkeley Emergent Space Tensegrities Lab

Mission Objectives

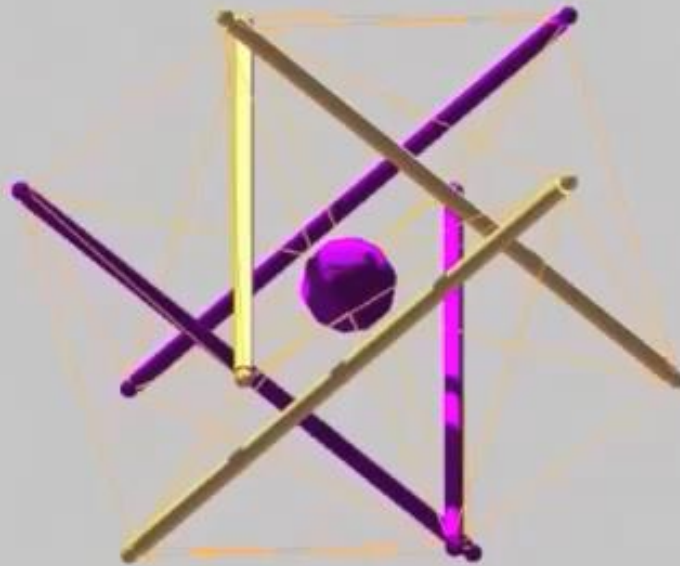


6-Bar Tensegrity Structure



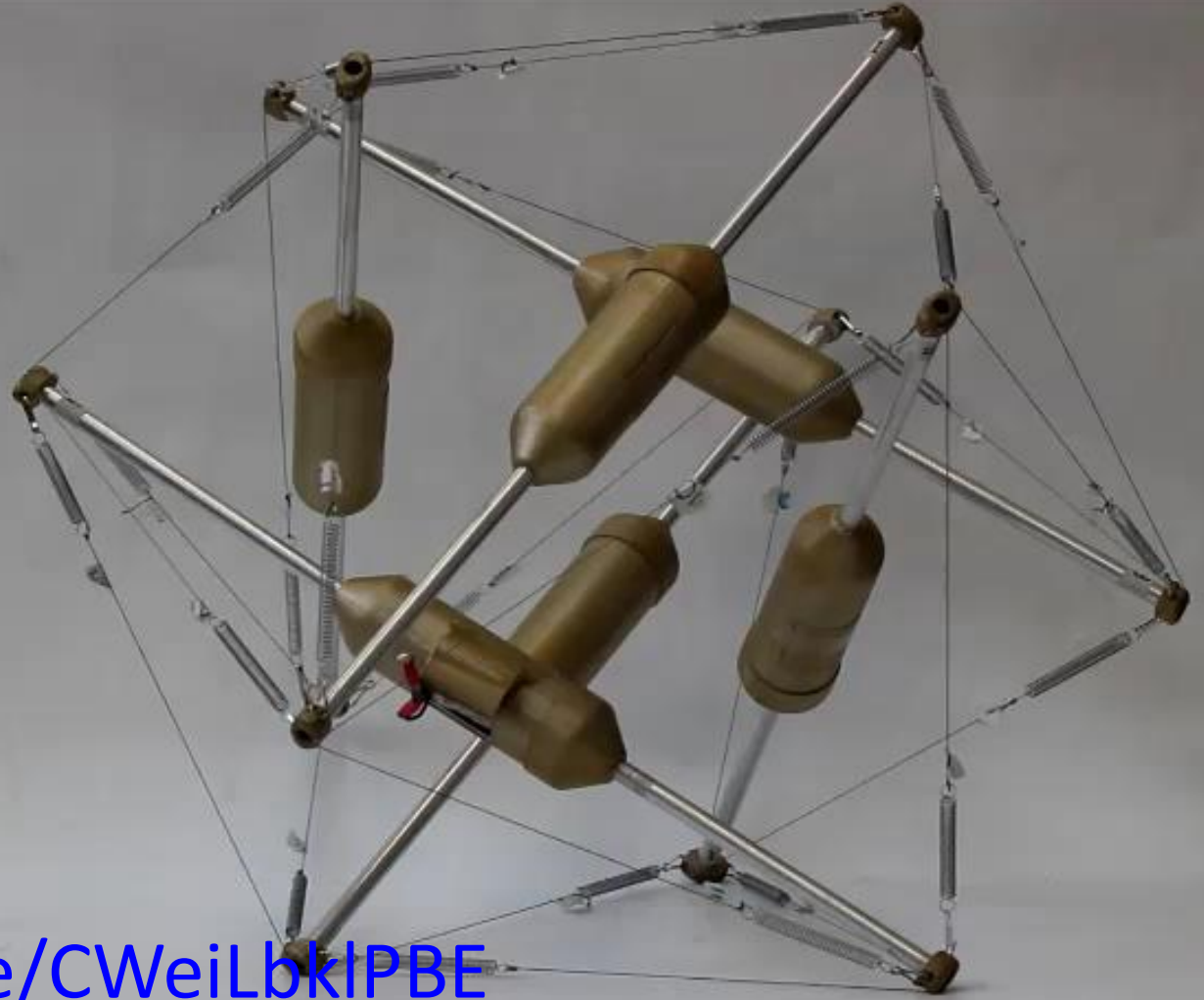
Tensegrity = Tensile Integrity

Impact Absorption



Protect center payload during impact

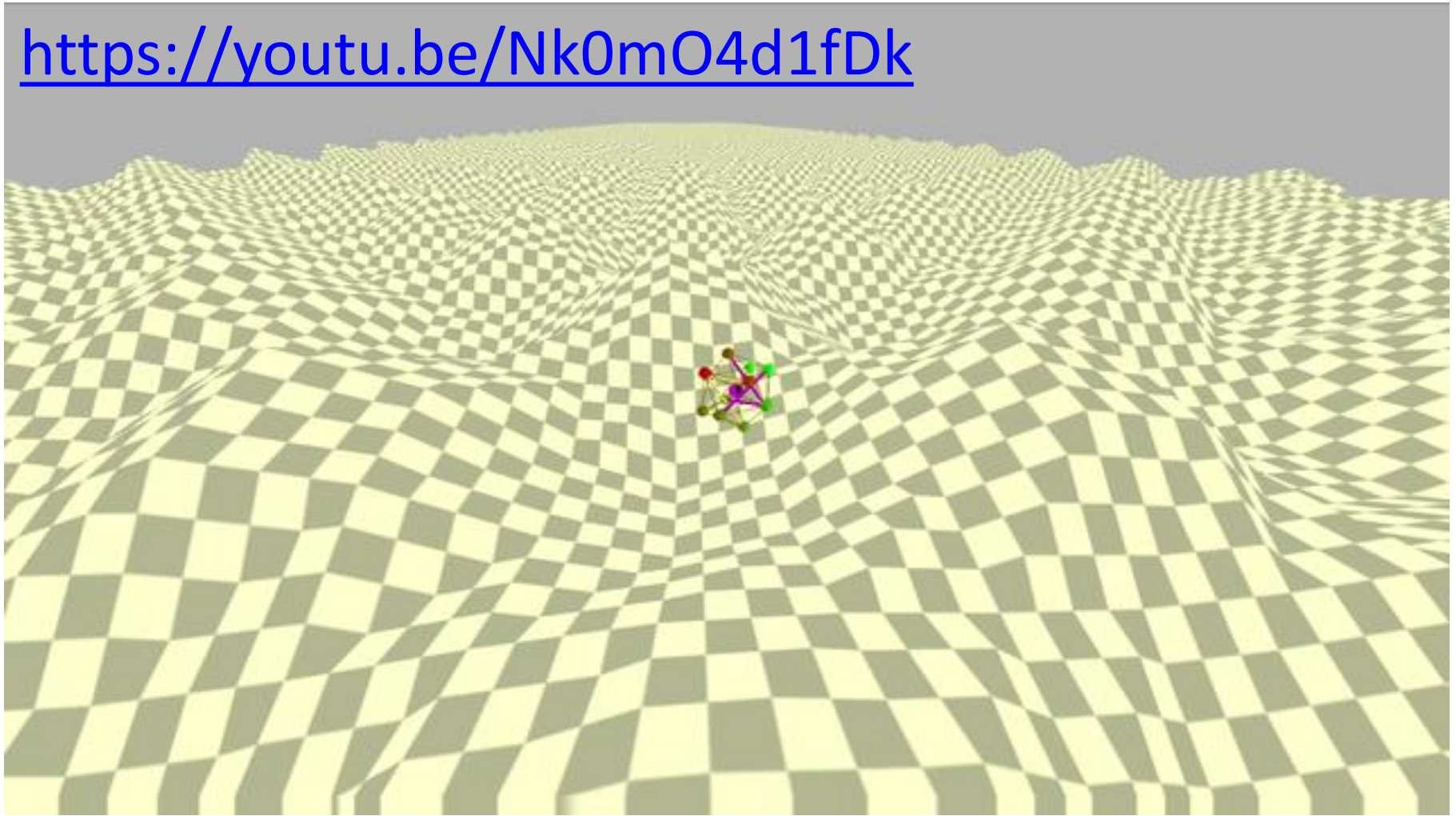
Berkeley Rapid Prototype V3 in Motion



<https://youtu.be/CWeiLbkIPBE>

Thruster-based Tensegrity

<https://youtu.be/Nk0mO4d1fDk>



Video from Last Year's Team

<https://youtu.be/v4KPxNjOnkl>

Future Work: Mechanical

Develop Next Generation Prototype:

- Sensor design for system feedback
- Friction reduction on actuation components
- End-node designs for improving rolling
- Housing re-design for impact resistance
- Design for manufacturing and assembly

Future Work: Controls and Software

Rolling with feedback control?

- Program microcontrollers to provide control signals to actuators
- Program wireless chips to enable communication between actuation modules
- Calibrate, test and install different types of sensors (e.g., IMUs, force sensors, stretch sensors, etc.) for state estimation
- Develop state estimation algorithms utilizing sensor readings
- Dynamics analysis of the robot
- Develop control algorithms for realization of punctuated rolling
- Real-time simulation of dynamic motions of the robot
- Design circuits for electronic components and PCBs

Future Work: Thruster-based Tensegrity

How can we make this robot to fly?

- Evaluate appropriate thrusters
- Characterize the thruster system and validate its performance in simulation
- Develop a control system for stabilizing thrusters
- Design and construct a device for impact tests
- Perform stress analysis both on structural and material level

Hope to See You Soon!

