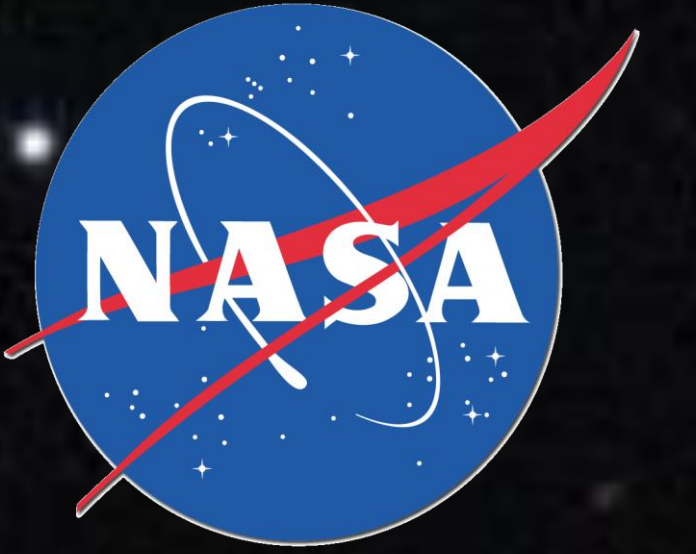


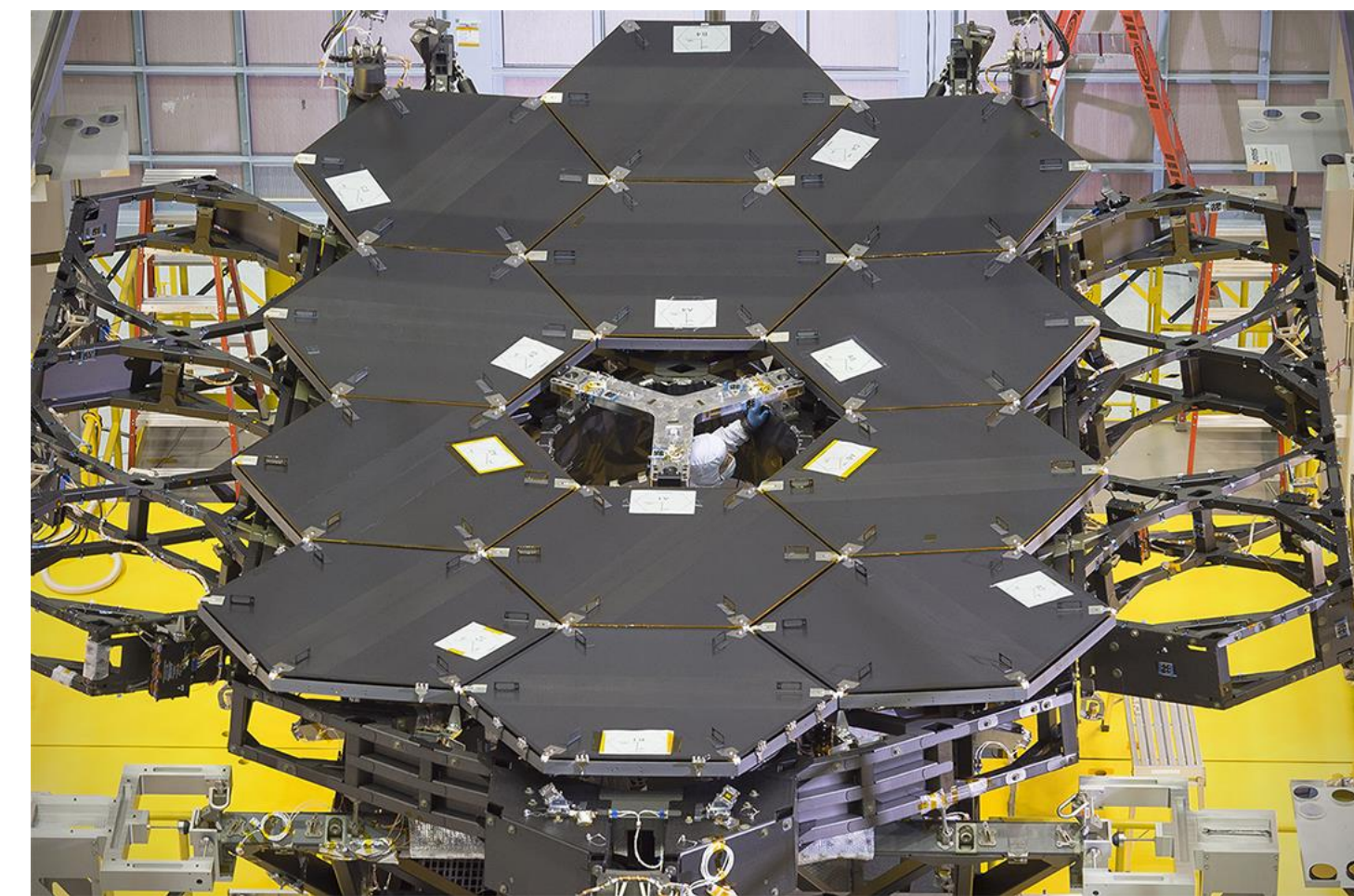
Utilizing Novel Magnets for In-Space Assembly



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Introduction

NASA scientists and engineers are working on developing and improving various technologies in the materials, structures, and robotic systems fields. Utilizing new types of magnets, named Polymagnets, can aid in cutting down size, cost, and/or build time of various structures by leveraging the magnets as aids in self assembly,

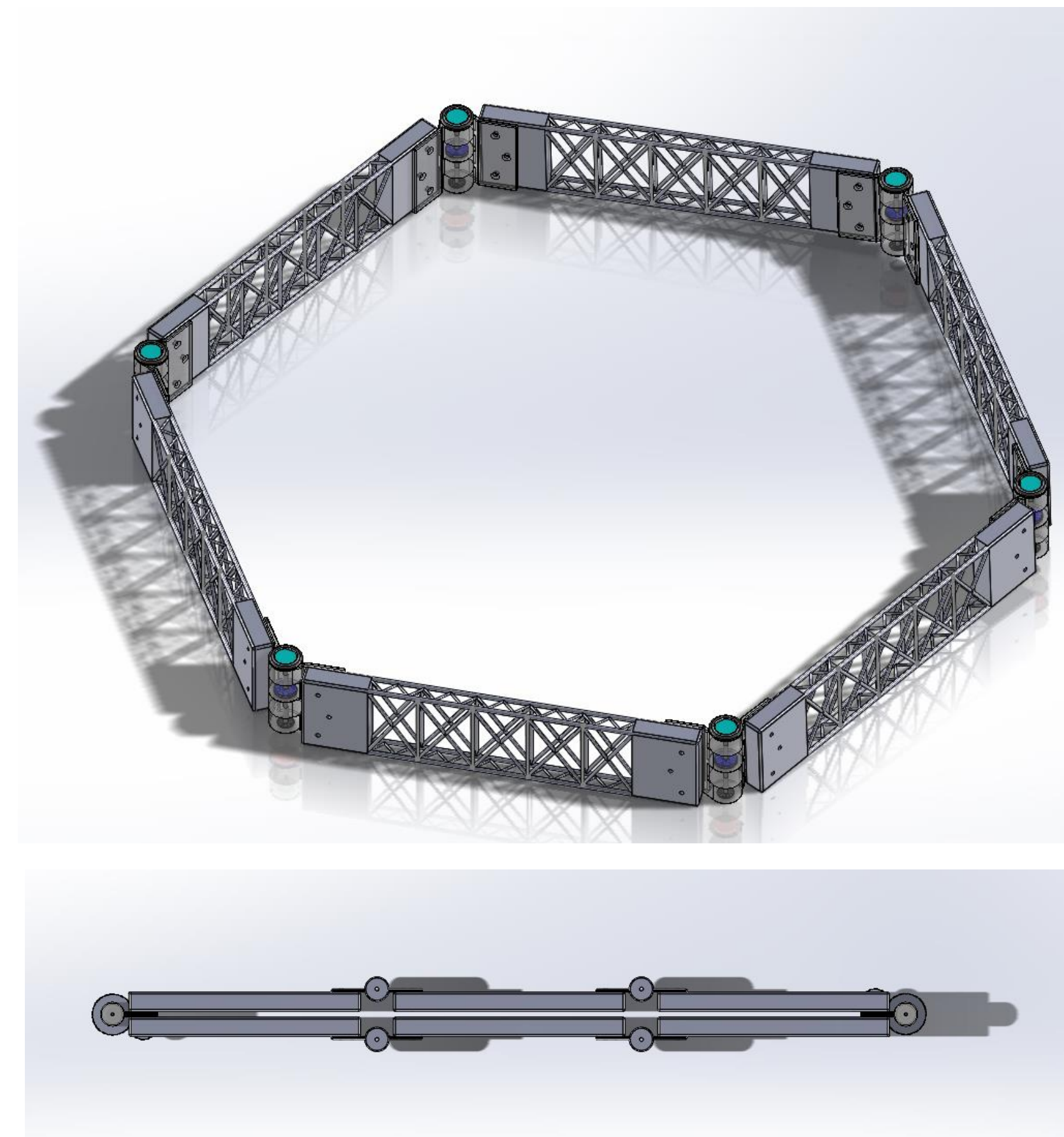


broadening our current capabilities in space. While other structures are also being explored, we are looking closer at telescope mirror assemblies, as they are large and costly to deploy into space.

Project Objectives and Goals

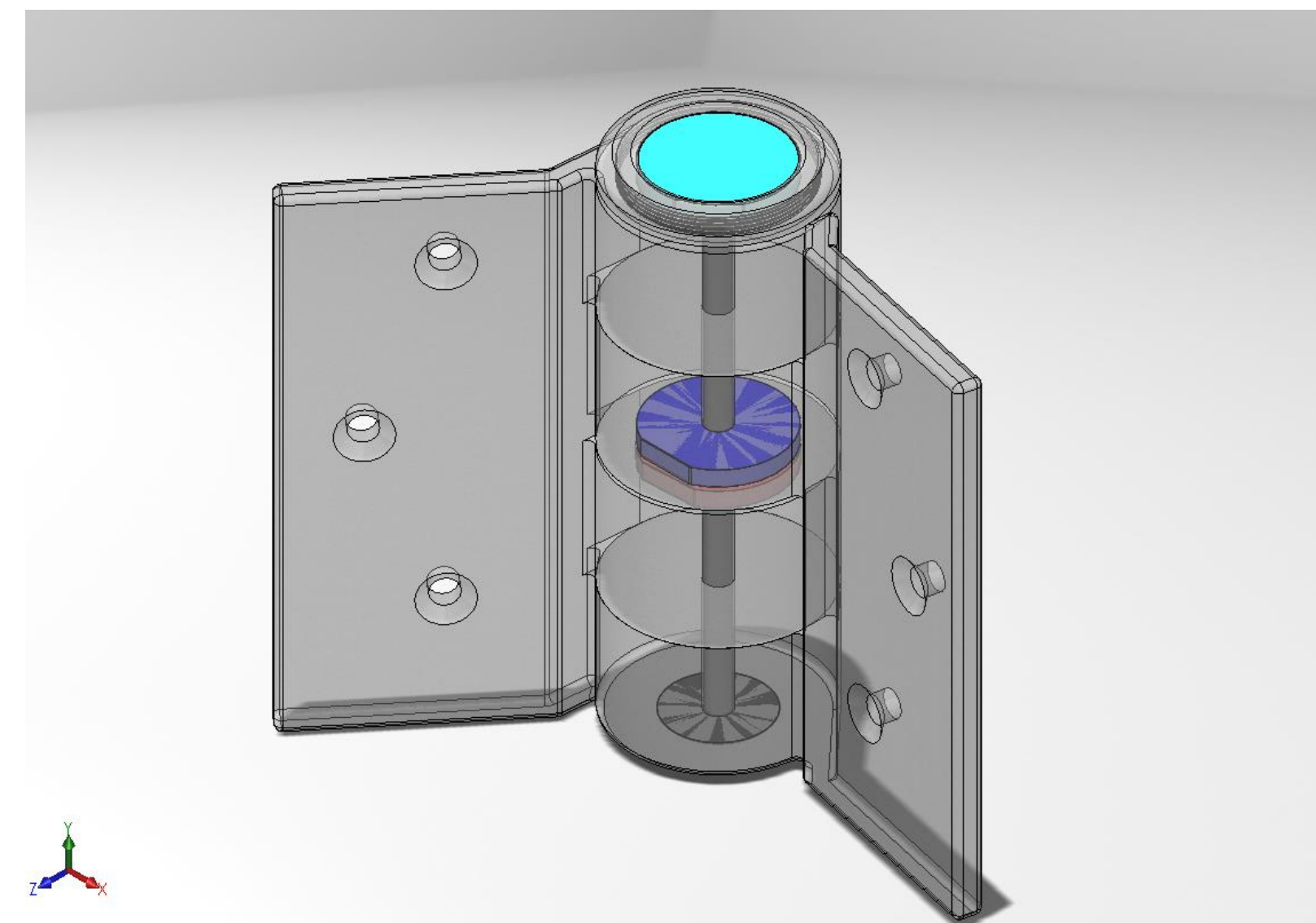
- Utilize various magnets from Correlated Magnetics to explore the different functions and uses of the different types of magnets currently available
- Study and compare the advantages of magnetics against current technologies
- Create a working prototype that demonstrates the reliability and versatility of magnets within space hardware

Initial Design



- The initial prototype is a single hexagonal frame that mimics the design of current telescope mirror assemblies
- This frame acts as a subunit that will attach magnetically to other, identical subunits to create a full mirror assembly
- Foldable for ease of storage within a rocket before deployment
- Motorized at two hinges to allow structure to autonomously unfold

- Structure relies on hinges to be able to fold and unfold
- As seen on the right, the magnets are imbedded within the hinge, keeping the magnets secure and shielded from debris
- Bright blue magnet on the top of the hinge will allow the mirror to attach in a certain orientation



Future Work

- Further develop the initial prototype to be more light weight and compact
- Further explore the types of systems the prototype could apply to
- Install an Arduino board onto the system and create a simple program to allow the system to unfold autonomously
- Develop the prototype further to meet requirements for testing in microgravity on the Vomit Comet
 - Fit within a 4 ft cube
 - Fully deploy within 20 seconds



References

- Bryan, W. (2019, August 20). 2020 NASA Technology Taxonomy. Retrieved June 08, 2020, from <https://www.nasa.gov/offices/oct/taxonomy/index.html>
- Polymagnet Correlated Magnetics. (n.d.). Retrieved June 08, 2020, from <http://www.polymagnet.com/>

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