NASA SPACE APPS –ORIGAMI CHALLENGE

30 second brief video on entire project

1.UNDERSTANDING THE PROBLEM

a.brief of the problem

b.resources being sent to space(types and material used)

c.effects or impacts of these problems

2.EXISTING SOLUTIONS

a.brief on different solutions

3.OUR SOLUTIONS

a.basic principle

b.origami inspired structures

c.blowup habitats,

d.we need solid models paper folded structures

e.virtual models

ORIGAMI SPACE RECYCLED

A Brief Introduction to the Problem

There is only so much volume a rocket can carry into space. Solar Arrays, parachutes, habitats, storage tanks, inflatable aeroshells all could be packaged more effectively to enable more cargo on any given launch, or perhaps even reduce the number of launches needed to deliver goods to space. Reducing weight and volume of storage components on a spacecraft is imperative in improving the efficiency and productivity of a space mission.

These principles of increasing packing and storage efficiency can be applied to various spaceship components such as solar sails, storage equipment and cubesats etc. Current principles can be improved upon and size constraints can be improved upon.

Some Existing Solutions

The SBIR topic area of Lightweight Spacecraft Materials and Structures centers on developing lightweight structures and advanced materials technologies for space exploration vehicles including launch vehicles, crewed vehicles and habitat systems, and in-space transfer vehicles. Lightweight structures and advance materials have been identified as a critical need since the reduction of structural mass translates directly to additional up and down mass capability that would facilitate additional logistics capacity and increased science return for all missions.

A 21ft supply cupboard packed with goods and a humanoid robot were added to the International Space Station as its 13th room, used as a storage room. Named “Leonardo”, it provides much needed storage space and is expected to do so for the next decade.

Our Solutions

The basic principle used to find solutions to said problem, is to maximise storage capacity while minimising volume and weight of the object in question. Methods such as using low density and low weight materials for construction purposes has brought a lot of changes in the packing and storage scenario in space stations, but there are other, more space efficient solutions possible.

1. Origami is the art of paper folding, often associated with the Japanese culture, though not exclusively anymore. The goal in origami is to use sculpting and folding techniques to transform a square sheet of paper into a finished sculpture.

Researchers say origami could be useful one day in utilizing space solar power for Earth-based purposes. One of the possible products of this school of thought could be an orbiting power plant that wirelessly beams power down to Earth using microwaves. Sending the solar arrays up to space would be easy as they can all be folded and packed into a single rocket launch, with "no astronaut assembly required."

1. Using techniques of Origami and its sister technique Kirigami, a sheet of single carbon atoms-Graphene, has been manipulated into tiny complex structures like springs. These techniques are increasingly influencing engineering and scientific research. Some mechanical properties of graphene mimicked those of a sheet of paper. The findings could pave the way to better flexible and stretchable electronics.
2. Inflatable habitats or expandable habitats are pressurized structures capable of supporting life in outer space whose internal volume increases after launch. They have frequently been proposed for use in space applications to provide a greater volume of living space for a given mass. Because the diameter of the habitat is not strictly constrained by the diameter of the launch vehicle, inflatables can have a greater volume of living space for a given mass. These can be designed to have higher resistance to [space debris](https://en.wikipedia.org/wiki/Space_debris).