Food Security in Space starts…on Earth!

A presentation by Paterson Aerospace Systems

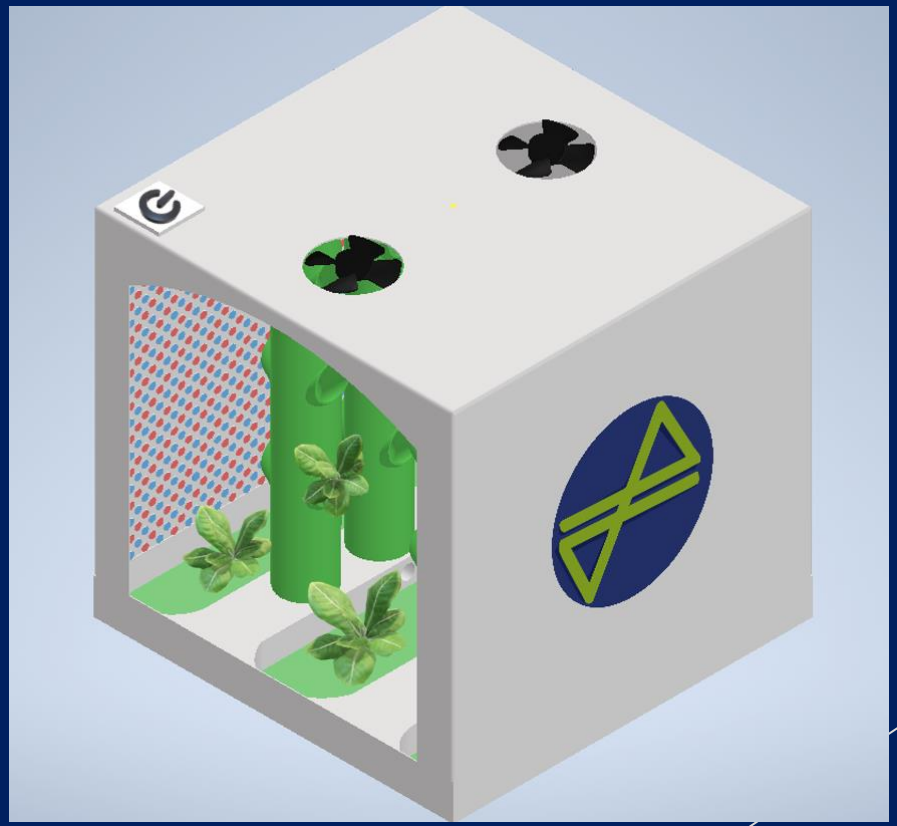
Who are we?

- Paterson Aerospace Systems aims to bring environmental consciousness to the aerospace industry through research and innovation. We rise to challenge the status quo by building a future where space exploration is sustainable, emission free and safe for everyone and their assets.

Growing Beyond Earth

- Goal: to design a system to optimize plant growing capabilities using limited space aboard the ISS
- Competition guidelines:
- The box has dimensions within the 50cm x 50cm x 50cm constraint
- It contains all components needed for successful plant growth including lights, water cycling and ventilation
- It is designed to optimize the number of plants which can be grown within the given parameters

https://www.instructables.com/Growing-Beyond-Earth-Submission/



Deep Space Food Challenge

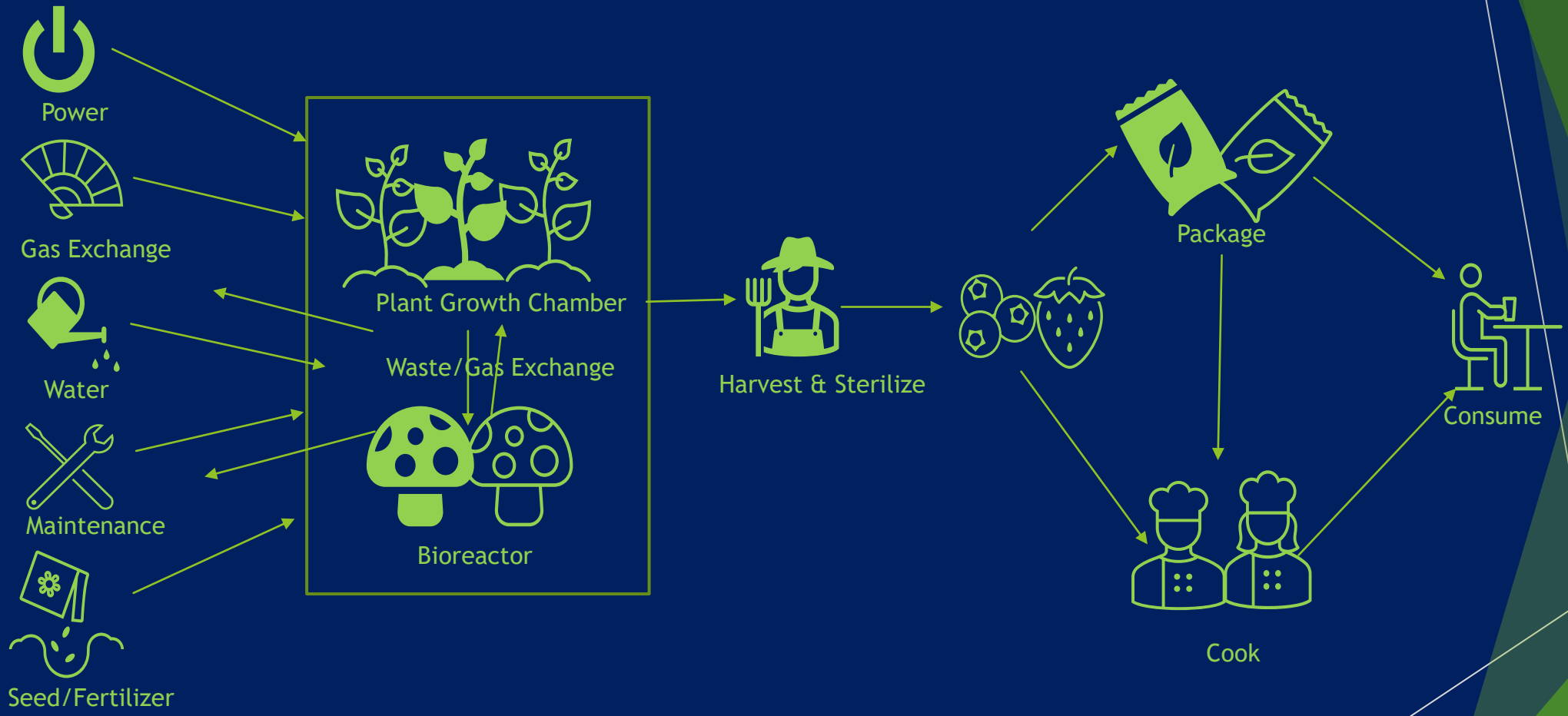
- Goal: to incentivize teams to develop novel technologies and/or systems for food production that need not meet the full nutritional requirements of future crews, but can contribute significantly to and be integrated into a comprehensive food system.
- Competition guidelines:
  - Help fill food gaps for a crew of 4 astronauts on a three-year round-trip mission with no resupply
  - Improve the accessibility of food on Earth, via production directly in urban centers and in remote and harsh environments
  - Achieve the greatest amount of food output with minimal inputs and minimal waste
  - Create a variety of palatable, nutritious, and safe foods that requires little processing time for crew members

- https://www.deepspacefoodchallenge.org/

Mycoprotein and Vegetative Resource Incubation Chamber (MaVRIC)

- MaVRIC leverages food production technologies known to work in space to produce fresh, highly nutritious and versatile foods. Our system produces both mycoprotein and fresh edible plants for astronaut consumption with minimal oversight or labor.
- It is a semi-autonomous food growth chamber consisting of a plant growth chamber and mycelium bioreactor and other necessary food processing equipment. It is a low maintenance system, having automated watering, light, temperature and humidity control, leaving only planting, harvesting and maintenance up to the crew. Upon harvesting, foods will be sterilized in UV chambers before packaging or consumption.

Concept of Operations



Community Engagement

- We have recently partnered with Heavenly Urban Natural (HUN) Gardens in the DC area to test our technology.
- Through this partnership, we aim to educate children in the community about Hydroponics and Mycology, while fostering creative thinking regarding space applications.
- We will also allow the garden and the community to keep and use all produce as they see fit.

Benefits

- Our system is designed to use resources such as water, power and space sparingly due to the resource deficit it will face aboard a spacecraft.
- For this reason, it is well suited to use in locations on Earth where resources are limited.
- We are outfitting the system with solar panels to minimize operation cost.
- Additionally, the automation of its processes make it less labor intensive than traditional farming, allowing communities to focus on other issues knowing that their food source is secure and guaranteed.

Protein

- Protein is a major nutrient which is not always easy to provide in such systems.
- Animal proteins can have a short shelf life and require special storage solutions.
- Additionally, cultural and religious standards may promote one meat over another or none at all.
- For this reason, the mycelium bioreactor is a key component in our design as it can be dried to have a very long shelf life and is completely vegan making it more acceptable to most traditions.

Thank you for your time

The Paterson Aerospace Team

Website: patersonaerospace.com

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