Project Themyscira

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Abstract

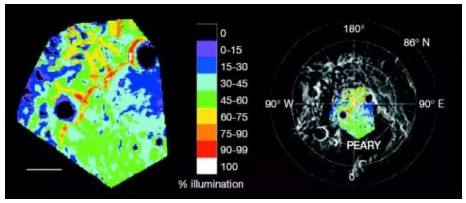
The purpose for this project is to design and plan a self-sufficient, sustainable lunar base capable of supporting five crew members for a period of six months. The feasibility is two-fold. It will test the effectiveness and efficiency of life-support systems to accomplish the mission, as well as evaluate its financial and logistical limitations. Currently, both governments and private corporations are developing lunar exploration projects for scientific research and spaceflight operations. This has brought up the need for sustainable human presence in the moon in the form of a lunar base. In this research project we aim to tackle those questions of feasibility by researching the existing literature in the subject.

Requirements

- Shall house five crew members at a time and sustain life for 6-month intervals punctuated by resupply missions.
- Shall be able to be built and initialized efficiently and effectively during the first few missions.
- Shall have a launchpad capable of hosting commercial spaceflight operations and be able to conduct scientific research and collect data for several applications.

Location

The team has determined that the ideal location is the Lunar North Pole as it provides enough sunlight.



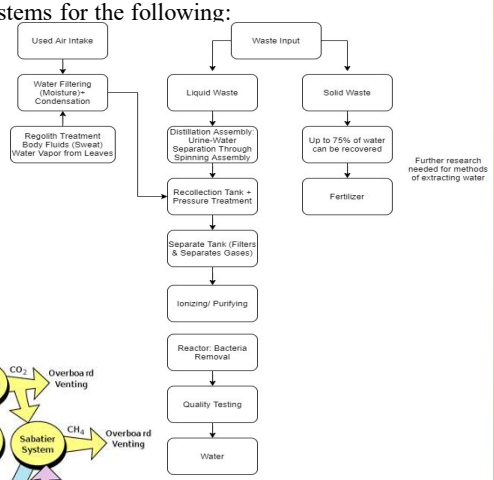
Subsystems

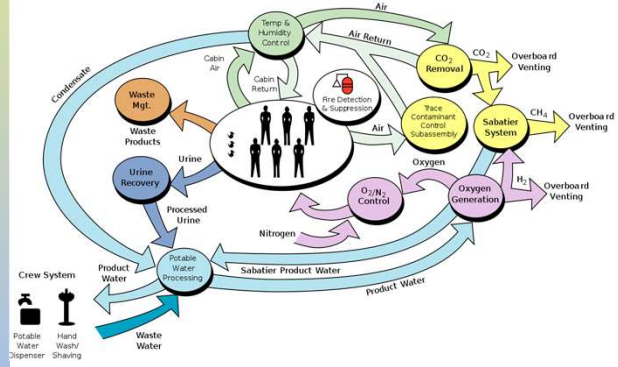
Currently there are three main subsystems that are being worked on: “Life-Support”, “Data Handling” and “Communications”

Life Support System

The team conducted an extensive literature survey on previous designs for human settlements in space and their limitations and designed systems for the following:

1. Oxygen Production
2. Waste Management
3. Water Recovery
4. Thermal Regulation
5. Food Supply





Data Handling System

Will acts as “the brain” of the lunar base, as it focuses on handling inputs from every other sub-system and feeding that data into whatever sub-system that needs it. To advance this sub-system the team created a variety of flowcharts and code necessary to make the system run.

Communications System

This system focuses on the transfer of information between Earth and the Lunar Base. The team did extensive research into laser communications as the preferred method of data transfer.

Results

This assessment yielded a series of constraints for the following systems

- Oxygen Production
- Atmospheric modeling
- Energy production
- Water Treatment
- Thermal regulation

The findings show that while not financially feasible, artificial atmosphere models, artificial photosynthesis and radiation protected-photovoltaic cells are some of the technologies that would allow the lunar base to support life.

Conclusion

To conclude, the project still has a lot of systems to complete before starting practical work. The team will continue by focusing on developing testing methods to optimize the systems necessary to sustain the lunar base. Other systems that need to be evaluated are:

- Energy Management System
- Budgeting and Business Proposal
- Building a communications Array

Completing this project would provide a great insight into:

- The future of space exploration within our lifetime
- Advancements in the field of Human Factors
- Breakthroughs in the field of Engineering

References

Bryan, William. “Technology Research on Station Breathes Life into Life Support.” *NASA*, NASA, 15 June 2017, www.nasa.gov/offices/oct/feature/technology-research-on-station-breathes-life-into-life-support.