LUNAR REGOLITH EXCAVATOR

NASA : Corporation 2

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Outline

1. Introduction to Design Objective
2. Design and Competition Requirements
3. Functional Decomposition
4. Subsystem Concepts and Analysis
5. Resource Budgeting
6. Project Management
7. Conclusion and Future Goals

1.1 Mission Objective

- The mission objective is to create an un-manned lunar device, that while self-propelled, excavates lunar regolith. The vehicle must be able to be driven and operated remotely. It must efficiently excavate 150 kg of regolith per 30 min in semi-lunar conditions.

1.2 Purpose of Design

- The design is to meet requirements for lunar conditions. The regolith excavated will be used by NASA in a process to extract oxygen and create water for a lunar colony. Certain requirements are set for power, size, and mass to ensure a feasible design. These requirements have been set by Rob Mueller, NASA Lunar Surface Systems Lead Engineer and the committee of the CSEWI competition.

2.1 Design Requirements

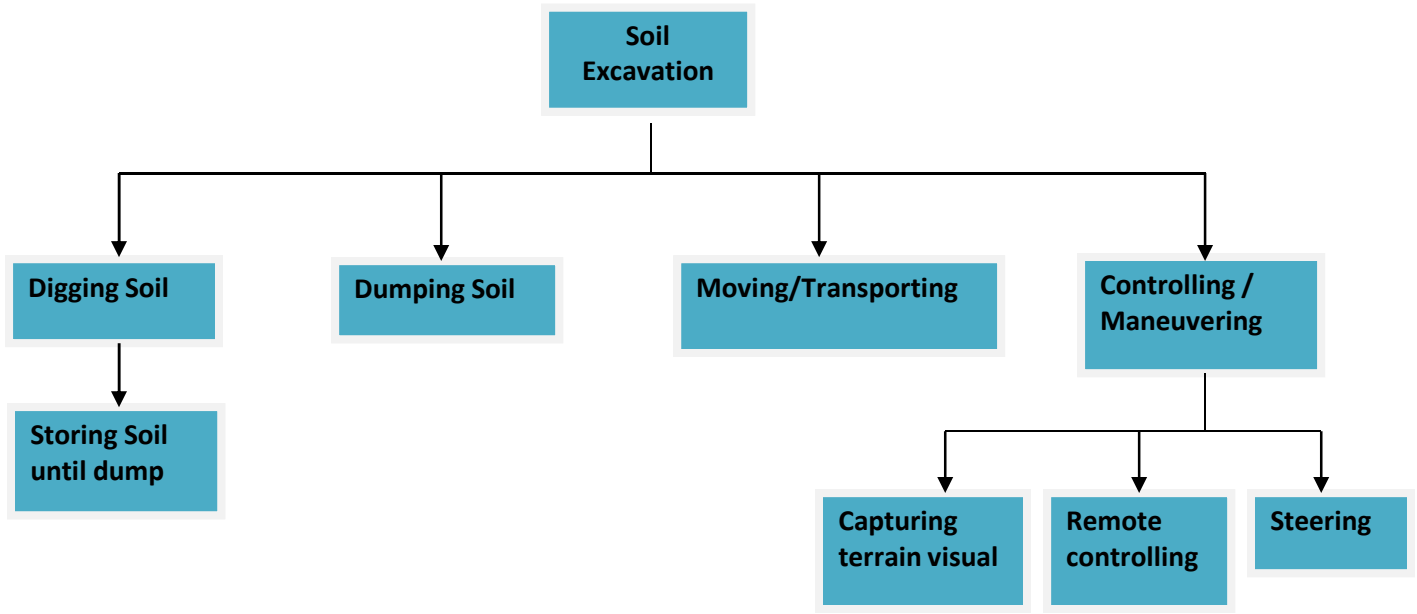
- The Excavator shall be an un-manned vehicle.
- The Vehicle shall be operated remotely/wirelessly.
- The Excavator shall dump at least at a height of 0.7 meters.
- It shall excavate 150 kg in less than 30 min.
- The design shall incorporate a video feed system to the ground station.
- The mass shall be under 80 kg.
- The Systems Engineering Process shall be well documented.
- The Design shall be entered into Lunar Excavating Competitions.

2.2 Competition Requirements

- Weight of excavation hardware may not exceed 80 kg.
- The Hardware must excavate 150 kg of regolith in less than 30 min.
- The regolith must be deposited in a collector with max height of 0.66 m.
- The only communications with the excavation hardware will through the provided communications link.
- The voltage shall not exceed 40.0 V.
- The Current will be limited by a Cooper Bussman BK/AGC-15 fuse.
- The total bandwidth shall not exceed 1.0 Mbps with at least a 2.0 seconds.

3.1 Functional Decomposition

In the beginning the necessary functions were stated so that concept generation could start without any predetermined solution to any one function.



3.2 System Hierarchy