**Morph Chart**

Primary principle for feature selection: **Simplicity - easy to design, build and operate.**

Secondary principle: Powerful and large enough to collect and move 5kg of regolith in four minutes.

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| --- | --- | --- | --- | --- |
| Function / Feature | **Option 1** | **Option 2** | **Option 3** | **Option 4** |
| **Body Material** | Plywood | Aluminum Sheet | Fiberglass | Carbon Fiber |
| Fabrication Method  (subsystem of material) | Nuts & Bolts | Glue (Titebond or JB Weld) | Screws |  |
| **Power Source** | Batteries | Fuel Cell | Solar Panels | Internal combustion |
| Battery Type (Power source subsystem) | Li-po | Lead-Acid | Ni-Cad |  |
| Voltage (Battery subsystem) | 24v | 12v | 9v | 5v |
| Propulsion (power source subsystem) | DC Electric Motors  (Direct Drive) | DC Electric Motors  (Indirect Drive) |  |  |
| **Movement** | Wheels  (Four-Wheel Drive) | Wheels  (Two-Wheel Drive) | Tracks |  |
| **Steering** | Differential steering | Two moveable wheels | Four moveable wheels |  |
| **Control Method (Microprocessor)** | Arduino | Raspberry Pi | STMicroelectronics NUCLEO-F401RE |  |
| **Control Method (Communication)** | Radio Control 2.4 GH RC transmitter and receiver | Bluetooth | Wi-Fi | Autonomous |
| **Regolith Collection** | Scoop | Horizontal sweeping roller | Vacuum System | Rotating Drum with scoops |
| Scoop Actuator (Regolith Collection sub-system) | Linear actuator | Servo | Pneumatic/Hydraulic |  |
| **Regolith Dispatching System** | Gravity fed with gravity opened gate. | “Dump-Truck” – tipping tray. |  |  |
| Gate Actuator (Regolith Dispatching sub-system) | Solenoid | Linear actuator | Servo |  |