The purpose of the 2023 NASA Lunabotics Competition is to build a rover that can navigate successfully around obstacles in order to excavate and deliver lunar regolith into a hopper. Team Vulcan’s rover will hopefully influence future NASA design and development.

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**Mechanical Design**

**Overall Rover**
The rover is comprised of three main subsystems: the drivetrain, excavation, and delivery. To power each of the rover’s wheels, four independent worm gear motors are utilized. The structure of the rover is primarily constructed from extruded aluminum T-slot frame, which allows for modularity and adjustability. The electronics housing is positioned centrally beneath the delivery subsystem.

**Excavation Process**
The excavation system is powered by a worm gear motor, which provides 6 Nm of torque to the chain system. Multiple steel scoops are attached to and moved by the chain system, effectively excavating sand and gravel. To adjust the excavation depth, two 18” linear actuators are utilized, while the angular position is controlled by a 9” linear actuator.

**Delivery Process**
The delivery system is outfitted with a 4” linear actuator to adjust the basket’s position in relation to the excavation subsystem, and a 12” linear actuator for angular orientation, which enables precise delivery to the sieve in the arena. The basket is constructed with an ABS frame and a steel mesh, designed to sift any excess sand with ease. Once the excavation is tilted out of the way, the delivery arm is then swung upward towards the sieve.

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**Electrical Systems**

**Electronics Housing**

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**Project Timeline**

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San Diego State University
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