College of Engineering
Department of Mechanical & Industrial Engineering

College of Engineering
School of Electrical Engineering & Computer Science

To Predict ▶ To Design ▶ To Perform

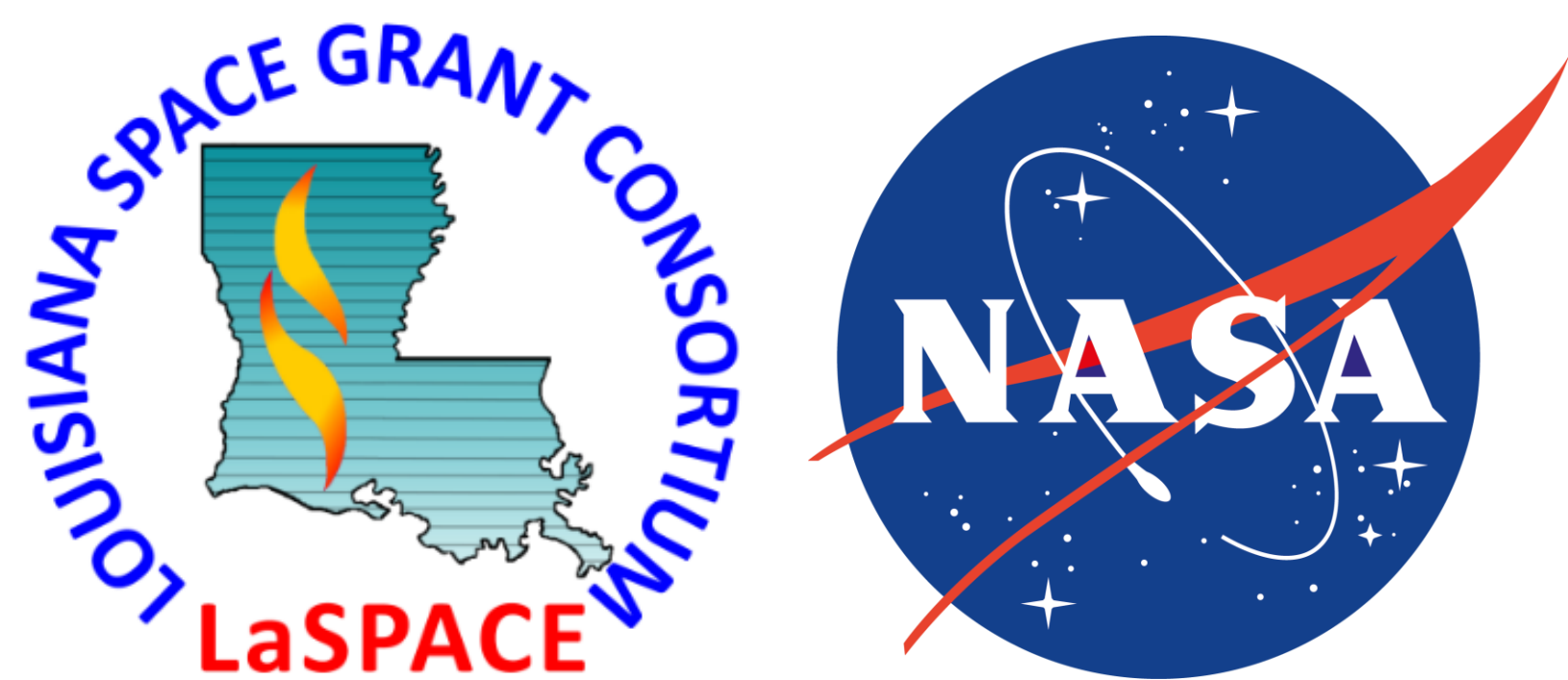**ME, ECE Capstone Design Programs**

Team #57: Planetary Rover for Rough Terrain

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Project Objective

Team 57 is tasked with creating a mobile, durable, and simultaneously lightweight autonomous planetary rover with room for expansion for future capstone teams, the LSU Electrical, and Mechanical Engineering Departments. The goal of the project is to produce a rover that can help educate students on robotics and expand the research horizons of the departments.

Background

Primary Purpose: To expand research horizons of Electrical Engineering Department.
Secondary Purpose: To introduce students to space exploration and engineering.

Constraints

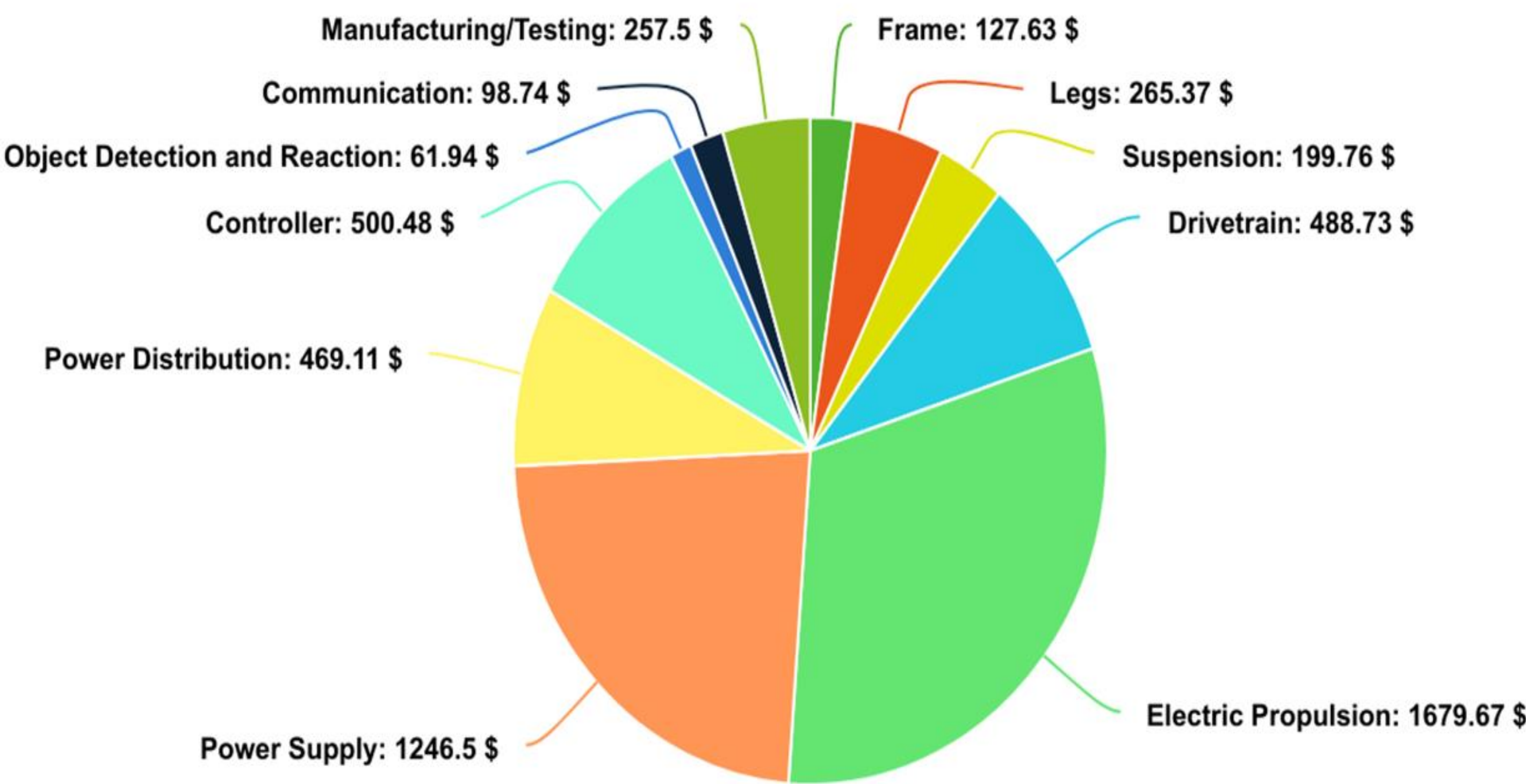| Name	Units	Value(s)	Measured
Weight	kg	100	77.25
Latency	ms	<50	22.27
Budget	$	6000	5605
Carrying Capacity	kg	35	36
Speed	m/s	1.25	1.34
Dimensions	m^3	1.25	1.25
Operation Time	min	60	>60
Detection Distance	m	2	2.25

Design

System Description

- Lightweight but simultaneous strong skeletal frame
- 6 wheel "Rocker-Bogie" suspension system and drivetrain
- Lightweight Lithium-Ion Battery

Subsystems

Name	Function(s)	Functionality
Frame	Facilitate Expansion	The main body of the rover that everything will connect to.
Legs	Drive on Various Terrain	The legs will serve as the connection piece between the frame and the drivetrain and will support the suspension.
Drivetrain	Drive on Various Terrains	The wheels and motors connected to the legs of the rover which will be responsible for forward motion and turning.
Suspension	Drive on Various Terrain	This works to ensure that all six wheels are on the ground at any given time and to prevent tipping.
Electric Propulsion	Drive on Various Terrains	The motors and motor controllers are responsible for the movement of the rover in the desired direction.
Power Supply	Distribute Power	The batteries will provide power to everything on the rover.
Power Distribution	Distribute Power	The power distribution board will distribute power to everything on board the rover.
Controller	Monitor System Statuses	How the rover will receive input from a separate computer.
Object Detection and Reaction	Contain Autonomous Features	The algorithm will detect objects and provide the rover with a reaction to them.
Communication	Transmit Data, Monitor System Statuses	The method by which the rover will communicate and send data collected by the sensors offboard.

Budget

The allotted budget for this project was $6000, and $5606 was spent

Manufacturing/Testing: 257.5 $
Frame: 127.63 $
Communication: 98.74 $
Legs: 265.37 $
Object Detection and Reaction: 61.94 $
Suspension: 199.76 $
Controller: 500.48 $
Drivetrain: 488.73 $
Power Distribution: 469.11 $
Power Supply: 1246.5 $
Electric Propulsion: 1679.67 $

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