



Heavy Lift Construction Platform



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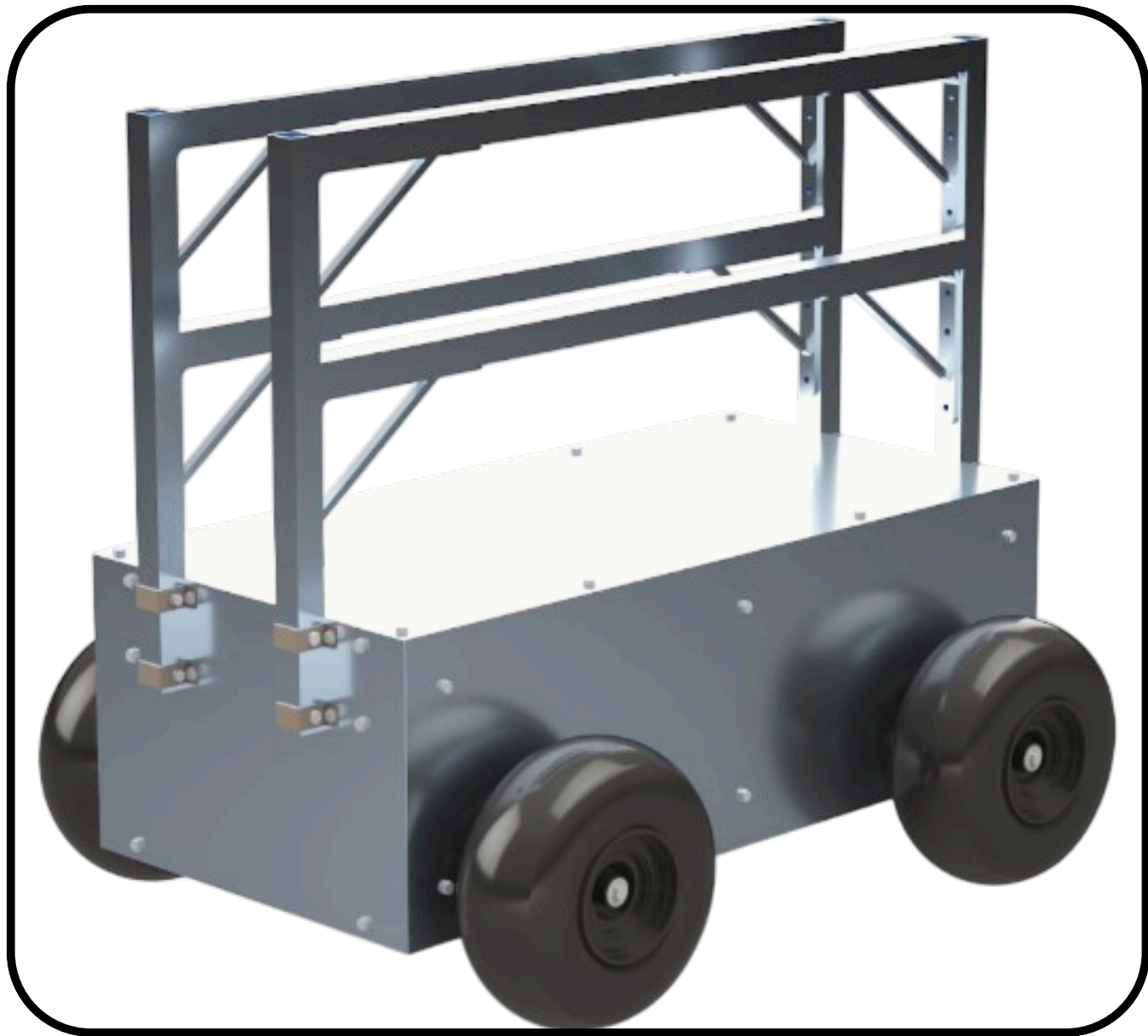


Figure 1: Robot Final Design

Project Description

The Heavy Lift Construction Platform (HLCP) also known as “The Beaver”, sponsored by Uplink Robotics in collaboration with Groathouse Construction and UW’s Electrical and Computer Engineering Department, addresses the challenge of transporting heavy materials on construction sites. By reducing worker strain and workplace injuries, it enhances efficiency in environments where traditional tools are impractical. The HLCP features a compact, all-terrain aluminum frame, high-torque motors, and puncture-resistant tires, allowing it to navigate rugged terrain while safely carrying at least 250 pounds in compliance with OSHA safety standards.

Design Components

The HLCP is a heavy-duty indoor construction robot with a 6061-T6 aluminum frame, SAE bolts, puncture-resistant tires, along with dust- and water-resistant electronics. It uses four Unite motors for skid steering, powered by a 50Ah, 25.6V LiFePO4 battery managed by RoboClaw controllers and an ESP32 microcontroller. An RC controller handles input. The adjustable motor mounts enable easy repairs. The drywall attachments, are lightweight and strong.

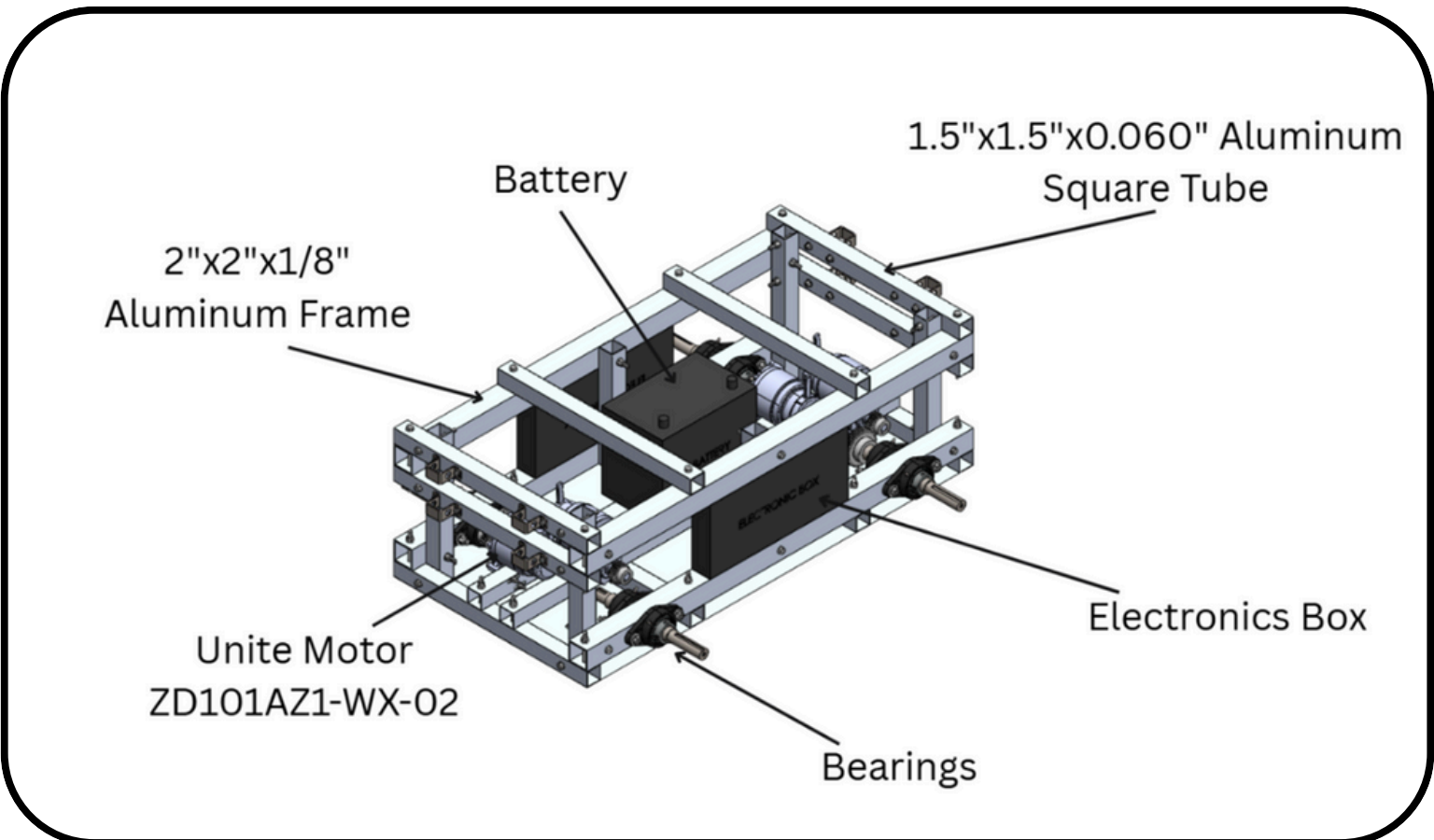


Figure 2: Robot Internals

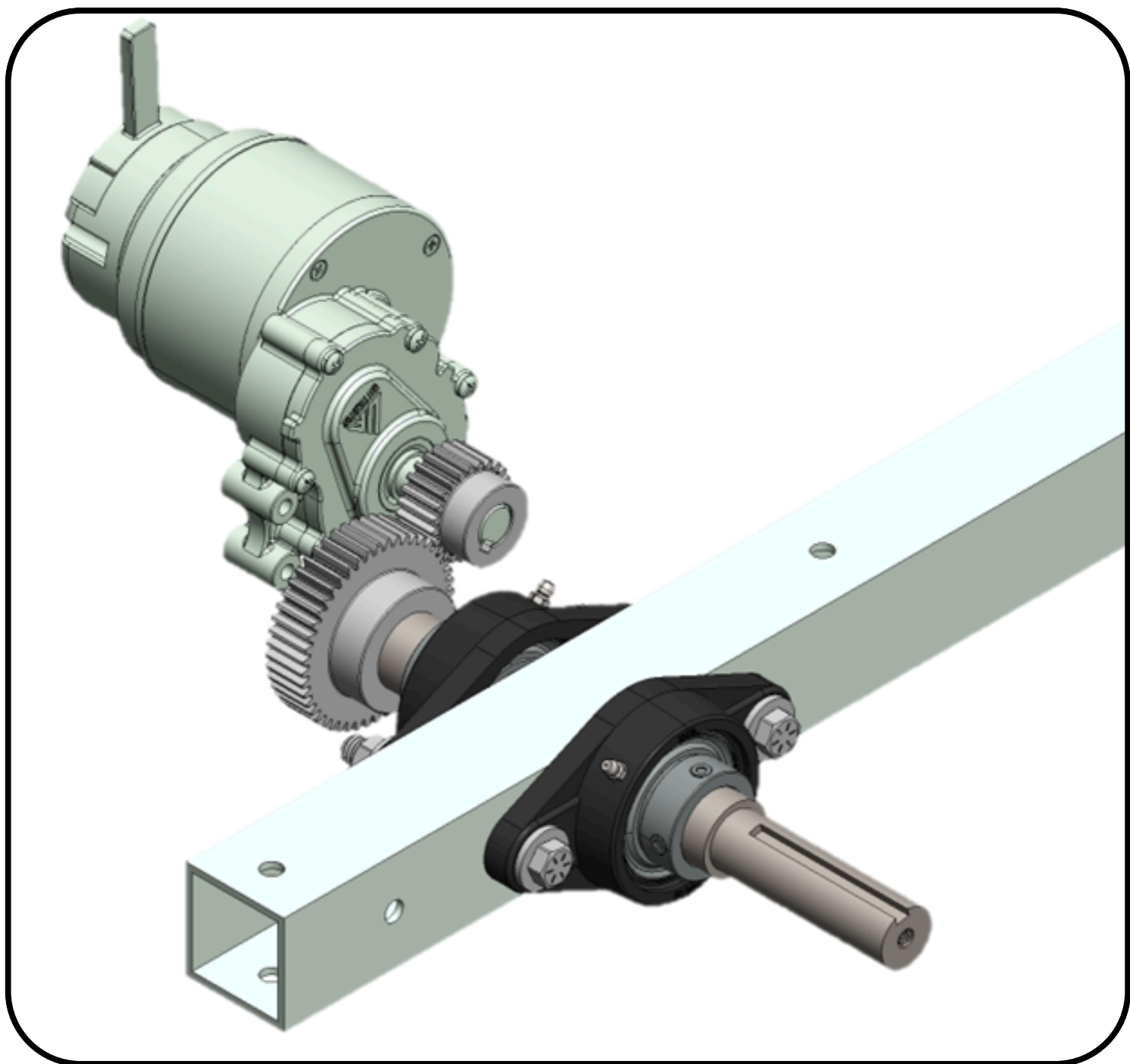


Figure 3: Gear and Bearing Assembly

Design Requirements

Product Requirement	Desirable Magnitude
Minimum Runtime	1 hour
Minimum Payload	250 lbs
Maneuverability	Must traverse over 2x4s, a 5% slope, and at least a 3-inch concrete step
OSHA Compliance	Must comply with all OSHA safety regulations
Durability	Must withstand impacts from 50 lbs concrete bags dropped from a minimum height of 25 inches. Must survive impacts against a hard surface at max movement speed
Size	Must fit through standard doorways easily. No larger than 32Wx50Lx16H inches
Emergency Brake	Must prevent rollaway on a slope. Must be engaged by default (takes power to remove) and must be mechanically overridden
Simplicity	Must be built from available SAE bolts, and parts
Weatherproofing	IP54 Rating
Speed	Must travel at least 3 mph (walking speed)

Client: UplinkRobotics and Groathouse Construction

UplinkRobotics creates high-quality and purpose built inspection tools for various industries, such as home inspectors, construction, firefighters, law enforcement and more. They’ve tasked the team with creating a Heavy Lift Construction Platform.

Groathouse Construction is a local general construction contractor who has volunteered to advise the team on essential robot traits, and provide a location to perform tests.



UPLINKROBOTICS LLC