

Design of a Cutting Tool for Clearing Underwater Vegetation

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Problem

A major problem involving the Phoenix canal systems is the constant buildup of underwater vegetation in the canals. Without clearing aquatic plants from the canals, certain parts of the city would become vulnerable to increased flooding in the event of a sudden downpour, leading to possible infrastructure damage. The objective of this research is to further the development of the bio-inspired fish being constructed by Dr. Aukes and his team of student researchers.

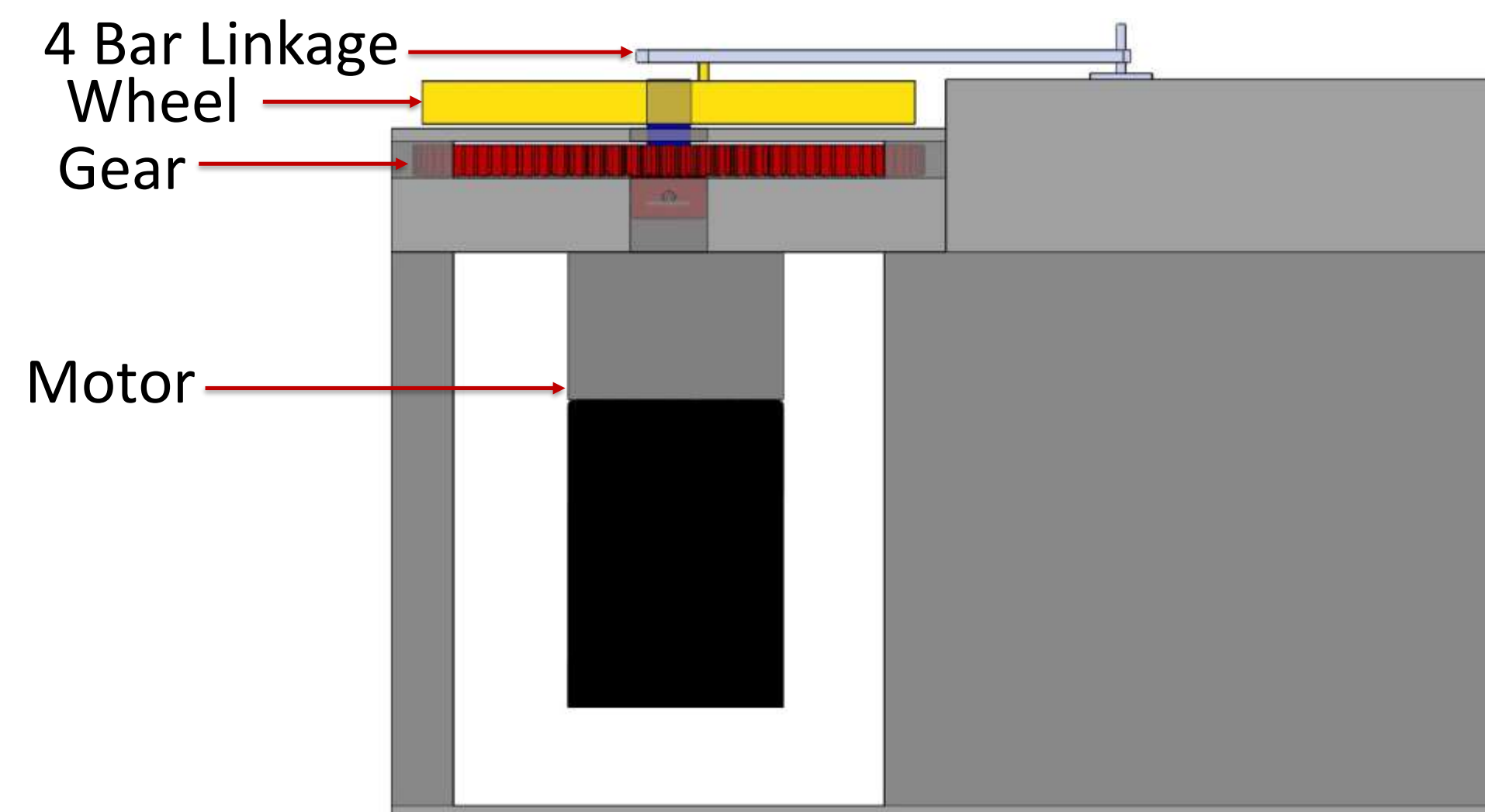


Figure 1: Side view of prototype cutter

Goal

Develop a lightweight cutting tool to be used in conjunction with the autonomous underwater robot to clear vegetation from the Phoenix canals.

Design

- Blades will be attached to two 4 bar-linkages
- 4 bar-linkages will be attached to two wheels
- Wheels will be powered via gear shaft
- Gear shaft will run from motor shaft through enclosed gearbox
- Gears will be powered via brushless DC torque motor
- Cutting tool will be attached to rigid base for stability
- Design allows for interchangeability of components for rapid testing and experimentation

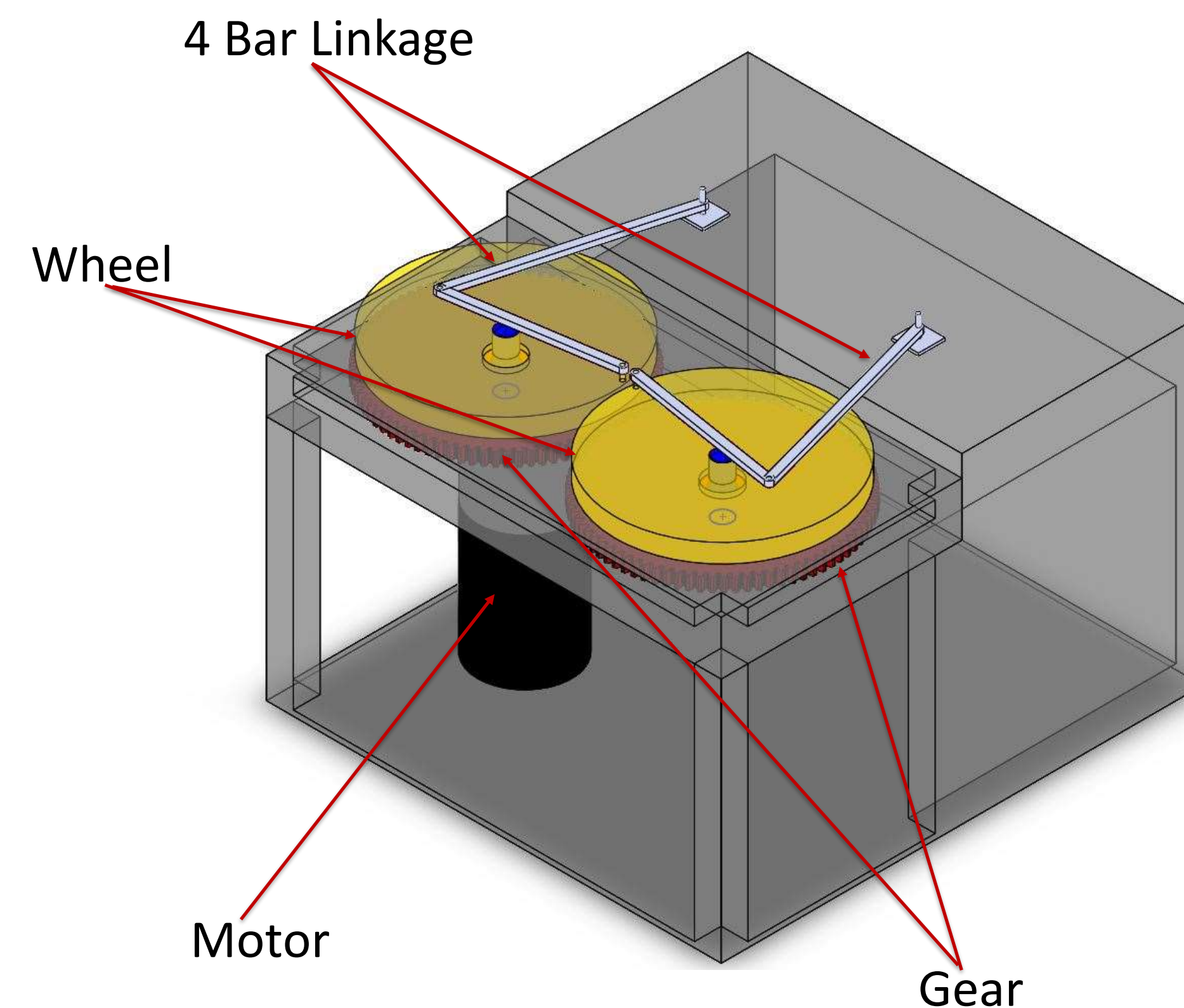


Figure 2: Dynamic view of prototype cutter

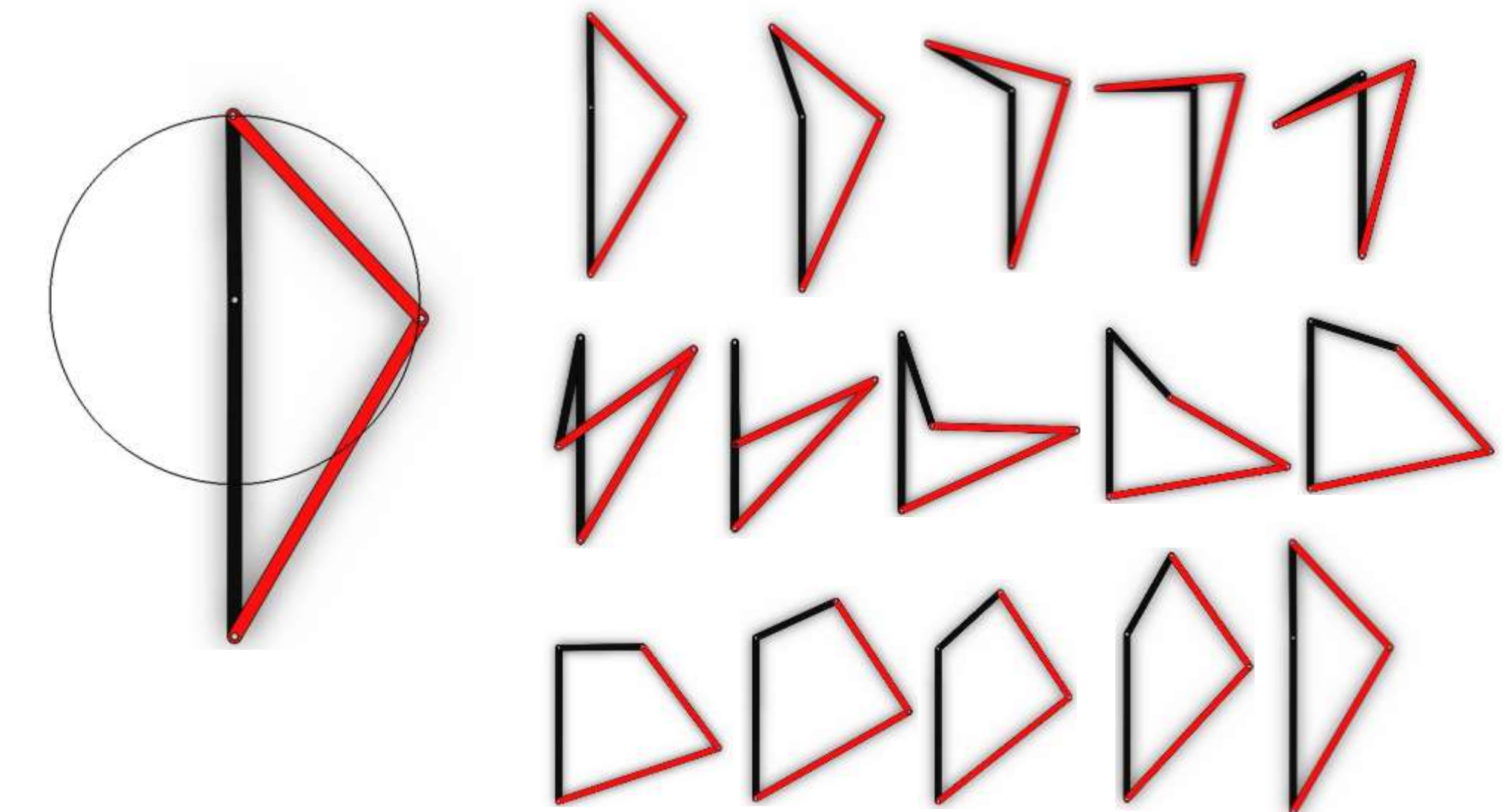


Figure 3: Motion analysis of 4 bar-linkage

Progress

- Design has been completed
- Motion analysis for 4 bar-linkage has been completed
- Sourcing and ordering of parts has begun
- Construction of base has begun
- Prototype gears have been 3D Printed

Future Work

- Construction of gear shaft
- Construction of gear box
- Assembly of prototype
- Analysis to determine most efficient linkage lengths
- Testing of cutter prototype with actual grass to determine maximum cutting efficiency