

# Sustainable Environment Autonomous Litter-Cleaner

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## Introduction

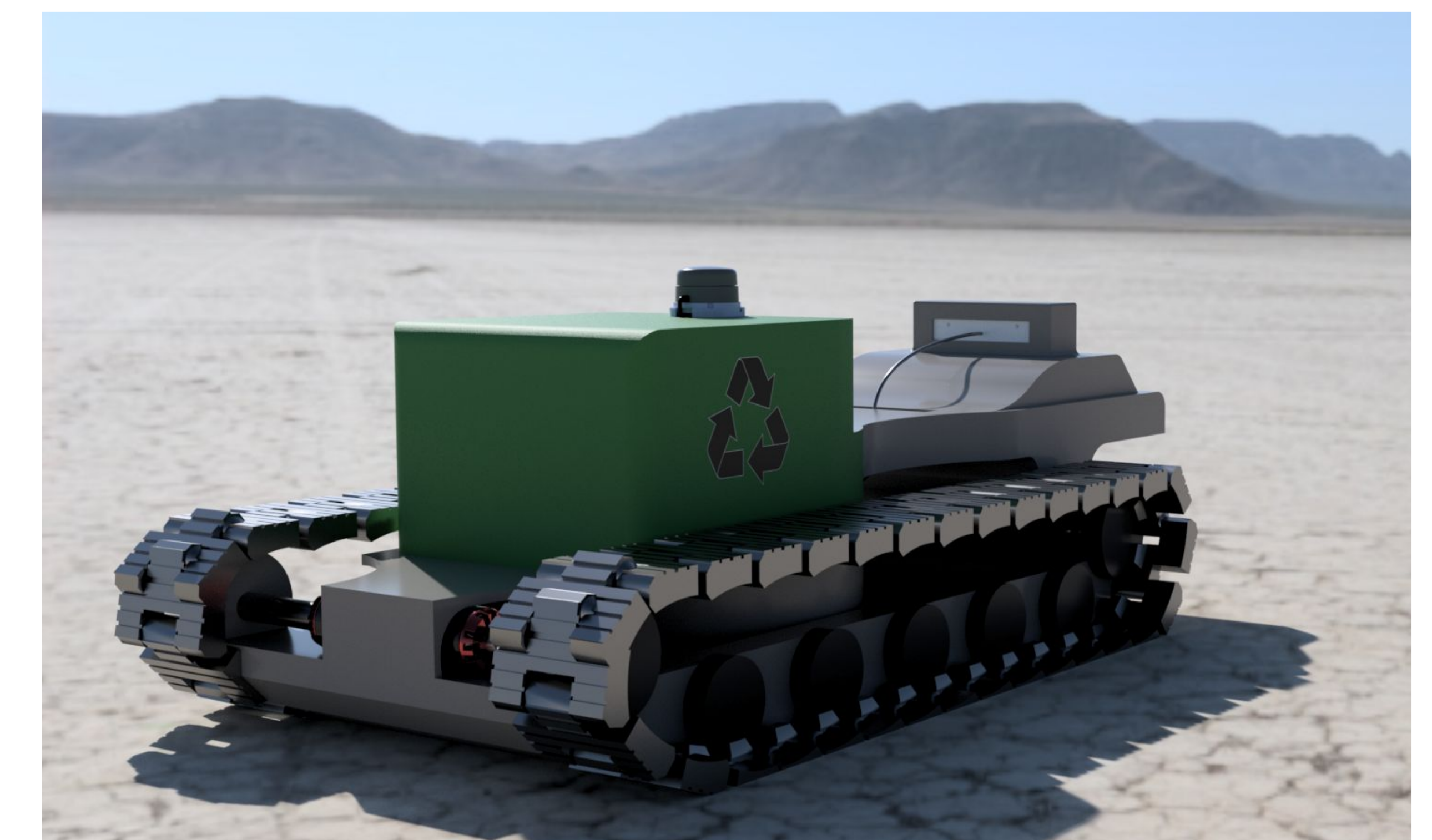
- SEAL functions as an autonomous track-based ground vehicle which can be deployed and parameterized to clean litter and natural debris from beaches.
- SEAL will utilize ROS, GPS, visual object detection, LiDAR, and SLAM to operate safely and effectively.

## Concept

- SEAL is designed to be deployed and seek out litter and natural debris using YOLOv11 object detection, driving over it, and picking it up from its underbelly, placing it into an onboard waste bin.
- SEAL will autonomously navigate with caution. Its primary systems being GPS and visual object detection via an onboard camera.
- SEAL will be capable of differentiating wildlife, obstacles, and humans, improving safety capabilities.

## Methods

- SEALs secondary Systems are LiDAR and SLAM.
- These more sophisticated systems allow SEAL to function more efficiently, being able to detect and visualize any kind of anomalies that may enter its immediate vicinity.
- SEAL will utilize these secondary systems as a failsafe, being able to continue operation should one of the primary systems fail.



## Conclusion & Future Work

- SEAL is currently being developed as an undergraduate research project within the Engineering Physics Propulsion Lab.
- These systems have already been tested in other applications for autonomous unmanned ground, aquatic, and aerial vehicles and have proven successful.