

## Project Deliverable B: Need Identification and Problem Statement

GNG 1103 – Engineering Design

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Need statement:

3 main focus ideas that stood out from Erin's project presentation: an improved filter, a protective shelter, and a wildlife camera mount.

First, as Bowie collects trash it also collects sand, illustrating its need for a sand filter. Collecting sand could be problematic, because it limits the trash intake with each run. For every run Bowie makes, an unnecessary amount of sand takes up space and weight inside of its hopper. As a result, there is a need for a sand filtration system that manages to keep the trash and eliminate sand that comes with it. This feature is most important to the Bowie project, and will include improving the hopper, adding a filter, and potentially adding a funnel or exit chute for the filtered sand. This will maximize the amount of trash Bowie can pick up by reducing the amount of sand (and weight) left in Bowie's hopper.

A second key focus area is a protective shelter for Bowie. After Bowie's operating hours, it would need a place to settle down, charge, and stay protected. This would improve its autonomy, while providing a safe, secure shelter where Bowie could charge up, empty its trash, and take shelter overnight. This could also protect Bowie from difficult weather

circumstances. However, it is essential that this shelter be optimized to avoid theft, using security measures that are built into the shelter.

Next, Erin's presentation illustrated a need for a wildlife camera with a mount. Due to Bowie's friendly nature and small stature, it does not scare away beach wildlife. This could be used to Bowie's advantage; Therefore, a mounted camera that could observe and film local wildlife in order to accumulate data would be useful. As a result, having a camera or another means of monitoring wildlife would add a new dimension to Bowie's use.

Problem statement:

There is a crucial need for a filter that reduces Bowie's sand intake. To improve both Bowie and the robot operator's experience, the hopper will be redesigned to use a gravity and filtration mechanism combination to filter out the sand while leaving the small trash in the hopper. This will maximize the amount of trash Bowie can pick up, while reducing the sand and the weight Bowie must carry.