Trash — Bot

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Abstract

- Plastic pollution is a grand challenge because there is 1) an abundance of plastic used in everyday products and 2) we have nowhere to discard of plastic.
- This leads to many negative impacts on the soil, waterways, and living organisms in these areas.
- Rationale: We noticed that there are many alternatives to cleaning up plastic from the oceans and waterways, but very little to combat the pollution on land. This is why our approach is to come up with a mechanism that can help remove the plastic pollution from land.
- Solution: Build a simulated solution to represent a theoretically way to solve this problem.

Introduction

- In the scientific community we saw already existing solutions that were trying to tackle the plastic pollution problem. An example of this, would be nets in the ocean that collect plastic. This idea helped us inform our idea, where we could pick plastic using a robot that operates on the land helping to reduce the amount of plastic.
- As mentioned in our abstract, we noticed that there are many alternatives to cleaning up plastic from the oceans and waterways, but very little to combat the pollution on land

Objectives

- Our grand challenge is to build a robot that is able to identify specific types of plastic, such as PLA and HDPE, and collect it over 3 different cases in a virtual simulation.
- The first case will be “best-case”, where the land will have very few plastic wastes that are near each other.
- The second case will be the “neutral-case” where the land will have more plastic that is more spread out, but not too dense.
- The last case will be the “worst-case” where the land will be covered in large amounts of plastic waste throughout the entire terrain. This will all be built in a virtual simulation, which we will make using Unity programming.
- After collection, our robot is going to take it to a recycling facility for further processing.
- Our robot is limited to the terrains it can roam due to the material it is built out of.
- The robot sensors we picked were ones that were going to differentiate whether a material was plastic, metal, or glass by analyzing the opacity and by checking the melting points. These sensors are difficult to implement in real life, not to mention they were out of the budget range that the GCI team was given. We decided not to implement it in unity, but instead shit our idea to be a robot that picks up trash

Best case: (sketch + Actual)

Average case: (sketch + Actual)

Worst case: (sketch + Actual)

Results

- Simulates picking up practice. In theory the robot takes the plastic to a recycling center
- The simulated robot is picks up recyclable products that are plastic
- We don’t have quantitative or qualitative results for our product as our deliverable is a simulation
- Figure 4 displays a robot that we are going to be using in Unity.
- Our data/ solution tells us that it is possible to replicate the drawings from Unity in real life

Tools and Methods

- We researched how to implement a design in Unity, and build a working design.
- Specifically, we developed and drew out sketches of the different cases our robot is going to pass through. (Cases graphic)
- Reflected those designs on Unity, and build the sketch cases in actuality, but from a birds eye view.

Conclusion

- We have conducted research on the best way to reduce plastic pollution.
- We found out that there are different types of plastic that can be recycled.
- Could not build a physical robot due to cost, so decided on creating a virtual robot using Unity.
- In Unity, the function of the robot is that it can scan different types of plastic and pick up the plastic it is supposed to recycle.
  - If the robot does not pick up the right plastic or material for recycling it gets damaged.
- In the real world, the robot will have a sensor and have a claw to pick up trash. If it does not pick up the right material, it would malfunction.
- The robot functions in unity, and from these findings a big picture outlook could be implementing this in real life in crowded cities.

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Literature Cited

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Figure 5 depicts the design of our robot in Unity.