TrashTrek - Navigating to a Cleaner Tomorrow

2023 Summer Bloom Bonanza (2023/08/13)

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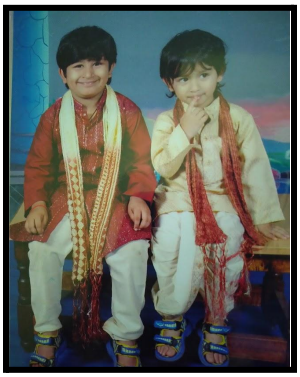
Pitch:

In my entire 16 years of life, I've never built a sandcastle.

Shocking as it may be, I've never felt the feeling of constructing an empire from grains of sand, water, and a trusty bucket. The primary culprit for this is the unfortunate reality that beaches have become increasingly polluted in recent times. Even as a six-year-old, I couldn't locate a single patch of untouched sand without encountering an assortment of litter, debris, and trash scattered along the shoreline. The very idea of a pristine beachscape, where one can let their imagination run wild with the creation of sandcastles, has become a distant memory. **But what if we could alter this narrative?** What if we could reclaim the magic of building sandcastles, not just for me, but for generations to come? Imagine a world where beaches are restored to their natural beauty, free from the grip of pollution, and where every grain of sand holds the potential for creativity and inspiration. Introducing *TrashTrek* – an innovative solution that seeks to redefine waste management and reimagine the beach experience. By combining cutting-edge technology, environmental consciousness, and a dash of creativity, TrashTrek aims to restore our beaches to their former glory. It's not just about cleaning up the mess; it's about transforming these spaces into havens of imagination, where sandcastles rise proudly and the shores are adorned with the footprints of joy.



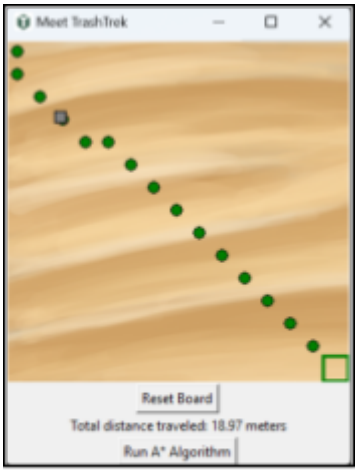
So, What is TrashTrek?

TrashTrek is a cutting-edge robotics application designed to revolutionize waste management. Leveraging advanced technologies such as the A* Pathfinding Algorithm, data analysis, and potential Computer Vision integration, TrashTrek is engineered to calculate the most efficient routes between trash collection points while considering obstacles and optimizing travel distance. Its innovative capabilities extend beyond mere pathfinding; TrashTrek has the potential to detect and categorize different types of waste through visual analysis, enhancing its efficiency in waste collection.

Exploring the Tech Behind TrashTrek:

Let's delve deeper into the technology that powers TrashTrek.

At the core of TrashTrek's functionality lies the A* Pathfinding Algorithm, a sophisticated and widely-used algorithm in robotics and artificial intelligence. This algorithm enables TrashTrek to determine the optimal path between trash spots with remarkable efficiency. By intelligently navigating through the grid, considering factors like obstacle avoidance and distance calculation, TrashTrek is able to deliver an optimized route that minimizes travel time and conserves energy. Moreover, one of the standout features of TrashTrek is its adaptability to real-world scenarios. By allowing users to place obstacles on the grid, TrashTrek simulates the challenges that robots might encounter in actual environments. When charting its path, TrashTrek takes these obstacles into account, adjusting its trajectory to navigate around them. This practical feature is an embodiment of TrashTrek's versatility and its potential to mimic real-world conditions.



TrashTrek in action.

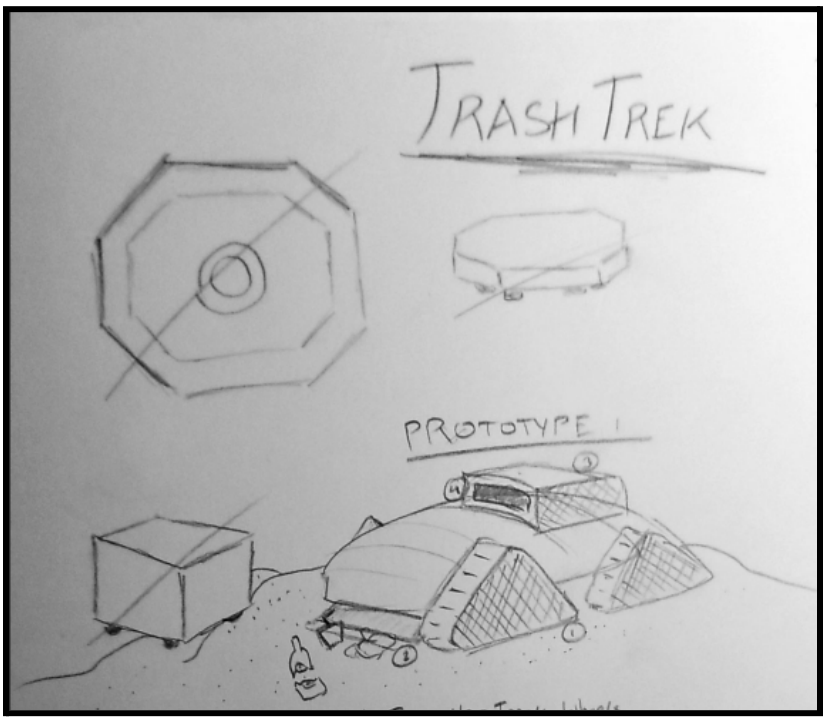
Looking ahead, the integration of Computer Vision (CV) systems represents an exciting avenue for expanding TrashTrek's capabilities. With CV, TrashTrek gains the ability to "see" its environment through cameras and sensors. This technology would empower TrashTrek to identify and analyze trash more effectively, potentially distinguishing between different types of waste based on visual cues. This advanced level of analysis could revolutionize waste management strategies by enabling more targeted collection efforts and informed decision-making. The implementation of CV would involve the strategic placement of cameras and sensors on the robot, allowing it to capture images and data from its surroundings. Machine learning algorithms could then process this information, enabling TrashTrek to recognize patterns and objects. By training the system to differentiate between trash and non-trash items, TrashTrek could autonomously navigate to collect waste while avoiding false positives.

Getting Started:

- **Drawing Obstacles:** Left-click and drag the mouse to draw obstacles on the grid.
- **Placing Trash:** Right-click to place trash objects that the robot will collect.
- **Run Algorithm:** Click the "Run A* Algorithm" button to start the robot's trash collection pathfinding.
- **Reset Board:** Click the "Reset Board" button to clear the grid and start fresh.

Watch as the algorithm calculates the most efficient path between trash spots:
Meet TrashTrek - YouTube

Prototypes:



Current Prototype (TrashTrek):

1. Reuleaux Track Wheels
    a. Enhanced traction and stability
    b. Rugged tire design to handle various terrains while ensuring optimal maneuverability
2. Trapdoor Latchdown System
    a. Implementing a robust trapdoor mechanism for efficient trash collection
3. CV (Computer Vision) System
    a. Cameras, sensors
    b. Real-time environment perception