AT-TR (All Terrain Trash Robot): A Trash Collecting Robot That Used AI to Traverse a Diverse Array of Terrains and Collect Different Pieces of Trash, Store it Inside the Robot

Juarez, Ethan (School: Buena High School)
Lopez, Jessalyn (School: Buena High School)
Alexander, Brody (School: Buena High School)

Accumulated litter in community spaces has a negative impact on local economies and aesthetic appeal. While autonomous cleaning solutions exist, most current market products, such as the Roomba, are restricted to indoor residential use and lack the durability for outdoor environments. This project details the development of a conceptual autonomous waste collection robot designed for high-traffic, semi-contained environments, such as fairs, malls, and university campuses. A primary focus of this design is the integration of high-diameter, semi-terrain wheels to overcome the limitations of standard indoor robotics. This modification allows the chassis to navigate varied outdoor surfaces and minor obstacles frequently found in public venues. The study involved a comparative analysis of existing autonomous systems and an evaluation of mechanical collection methods suited for uneven terrains. Preliminary results suggest that deploying autonomous units in gated environments significantly reduces the risk of theft while maximizing trash collection efficiency during peak event hours. This project presents a specialized solution for venue owners to maintain cleanliness and community appeal, filling a critical gap in the current autonomous cleaning market with a vision for future all-terrain implementation.

Awards Won: