# GACPETE-ECO

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The objective of this research was to mitigate environmental pollution from plastic bottles and aluminum cans using an autonomous robot: Gatherer of Aluminum Cans and Polyethylene Terephthalate-Efficient Compression Optimization (GACPETE-ECO). This study investigated whether an Arduino-programmed robot could collect these materials on various surfaces. The hypothesis posited that the robot could effectively collect both materials on different surfaces. GACPETE-ECO featured a crushing mechanism for space optimization and ultrasonic sensors for waste detection. The robot's dimensions were 43.18 cm in height, 60.9 cm in width, and 71.12 cm in length. It was designed to operate autonomously, identifying and collecting waste without human intervention. The project comprised three phases: a literature review, robot construction and programming, and functionality testing. To prove the hypothesis, transects of 3 meters by 3 meters were marked on eight different surfaces where garbage is normally found. These surfaces included rocky terrain, steep grass-covered areas, flat grass, wet grass, cobblestones, asphalt, sand, and tall grass. The transects contained cans and bottles, which had to be detected and collected using the robot's ultrasonic sensors. GACPETE-ECO successfully operated on all tested surfaces. Results indicated that the robot was more efficient on steep surfaces and less efficient on tall grass. Specifically, there was a 46.99-second difference in bottle collection time and a 45.74-second difference in can collection time between these surfaces. The average collection time was 17.70 seconds for cans and 14.50 seconds for bottles. These findings confirmed the robot's ability to optimize waste collection in diverse environments, validating the hypothesis.

**Awards Won:**