SMART BINS - AUTOMATED TRASH SORTING SYSTEM

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Introduction

While throwing away trash, people are often uninformed about the proper bin to place their garbage in. This may cause compostable trash to go into recycling bins, causing detrimental trash sorting problems. Putting non-recyclable material into the recycling bin not only hurts the planet but also incurs higher safety risks for recycling facilities.

Recycle   Trash   Compost

Project Goal

The goal of our project is to make it easier for people to simply throw away their trash. People will not have to debate between the differences between recycling and compost. We provide an automatic sorting in the small form of a trash can that can be used anywhere.

Material

- Arduino
- Camera module
- Servos/Actuators
- Trash Bins
- Microsoft Azure
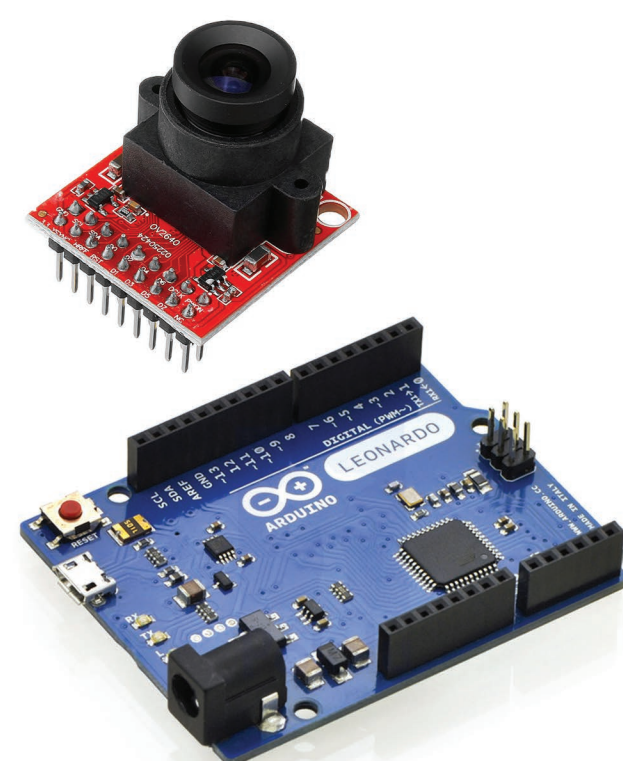
Current Progress

Software
- Created an initial classifier
- Gathered datasets from online sources
- Set up database to store image data

Hardware
- Adding camera modules to existing trashcans
- Programmed callback to Azure from Arduino

Future Work

- Construct trash-sorting mechanisms
- Continute training model for higher accuracy
- Set up arm and testing station for testing hardware portion in tandem with the software.

Challenges

Machine learning projects typically have trouble collecting enough data to train a viable model. To remedy this, we designed our project with the ability to collect more data as time goes on. This is done by having a feedback loop where people can correct mislabeled waste, which in turn will allow the classifier to improve itself and make better predictions. Another challenge we faced was coming up with a simple, yet versatile design that allows waste to be thrown away without user interaction.

Milestones

Milestone 1: One aspect of this project is the ML classifier for different types of trash. A milestone for this is to setup an Azure account and create a working classifier model.

Milestone 2: Another milestone is to program and setup an Arduino board on physical trash bins with various sensors and mechanical parts to physically sort the user input (trash).

Milestone 3: Our last major milestone is to develop an analytics dashboard in order to track smart bin usage data, machine learning model accuracy, and trash output statistics.

References

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System Architecture

Initial Dataset → Dataset → Train → Classifier → Microsoft Azure

Dashboard → Feedback → Label → Hardware

Trash Bin Design

Camera
Object
Servo 2 (vertical rotation)   Servo 2 (horizontal rotation)

Recycle, Compost, Trash Bins