SMART WASTE SEGREGATION

Guruprasad Hadimani Nagesh K J Laxman Sanathkumar G Charanraj B R
Department of Computer Science and Engineering, PES University.

Problem Statement

- Design a system that automates the process of segregation of waste.
- The system should categorize waste into wet, metallic, plastic, and glass categories.
- The entire system should work as expected when the waste is placed one by one on the belt rather than placing mixed waste.

Background

- Some of the existing systems categorized waste into wet, dry, and metal while other categorized into glass and plastics.
- The proposed system combines multiple existing systems delivering more robust system.
- Design of the proposed system is simpler in contrast to some of the existing system by using various sensors.

Dataset and Project Requirements

- Link to the dataset containing glass and plastic images.

  https://drive.google.com/file/d/1mkMhTdFVIUKBW6HW3wlcSdDiVmd9BExQ/view?usp=sharing
- The system should work in low power consumption mode.
- The system should be affordable in terms of labor and usage.

Design Approach / Methods

System is designed to work in low power consumption mode using an ultrasonic sensor which detects the presence of materials. Once materials are detected, the entire system comes to working mode. Initially the waste is checked if it is wet if found so it will be segregated at that point itself else it moves to metal detection module where it is segregated if found to be metal else it moves to the glass or plastic detection module. This module uses an image classifier model to differentiate between glass and plastics.

Constraint: Garbage mixed and given for separation may not be classified into the correct category.

Results and Discussion

Sl.No	Materials used	Expected outcome	Actual outcome
1	Wet paper	Wet	Wet
2	Wet cloth	Wet	Wet
3	Metal tin	Metal	Metal
4	Glass bowl	Glass	Glass
5	Soft drink plastic bottle	Plastic	Plastic
6	Steel tumbler	Metal	Metal
7	Glass tumbler	Glass	Glass

Metal tin is segregated at the metal detection module

Summary of Project Outcome

- The proposed system was intended to segregate the waste into different categories such as wet, metal, glass, and plastic.
- The wet and metal waste detection modules were successfully built using sensors whereas an image classifier model was built to differentiate between glass and plastics.
- In this way, the intended purpose was achieved.

Future Work

Enhancements over the proposed system are as follows

1) Incorporation of chemical sensor to detect any harmful substance present in the waste.
2) Handling the mixed waste given to the system at once.
3) IoT adoption for counting different types of waste segregated and performing visualization and data analytics on the same.

References

N. S. Gupta, V. Deepthi, M. Kunnath, P. S. Rejeth, T. S. Badsha and B. C. Nikhil, "Automatic Waste Segregation," 2018 Second International Conference on Intelligent Computing and Control Systems (ICICCS), Madurai, India, 2018, pp. 1688-1692, doi: 10.1109/ICCONS.2018.8663148.

Guruprasad Nagesh K J Laxman Sanathkumar G Charanraj B R