

Students Names:

Husain Almashhad (CS), Ali Abukaboos (CS)

Nebras Alrebh (ME), Ali Alqanbar (ME)

Adnan Aljaroudi (CE), Ahmed Alsadah (CE).

Smart sorting bin

Senior Design Project

Team no. :

86

Coach:

Dr. Usman Ali



INTRODUCTION

Smart sorting bin system tailored for the restaurant industry is designed to improve waste management by efficiently sorting waste into glass, plastic, metal, and paper. It features ultrasonic sensors in each bin to monitor the used capacity and a load cell sensor for recording weight of objects and perform real-time analysis on them.

PROBLEM STATEMENT

The absence of waste sorting bins increase the work and cost that recycling company do and spend for waste sorting. The smart sorting bin will sort the waste automatically at the source. This will make recycling companies focus on the recycling process only.

CONSTRAINTS

Hardware Limitations: processing time, memory space.

Space constraints: Physical design may have limitation caused by the sensors, camera, gate.

Dataset size and quality.

Receiving 1 Object per time.

Object size and shape.

TARGET SPECIFICATIONS

- Ai model accuracy: 90-95%
- Required identification time: 10 sec
- Sensors range detection: 60cm-80cm
- Weight measurement: 1g-100g
- Structure sections: 4 x 62.5 l

PROJECT IMPACT

The project will enhance the recycling industry by providing sorted waste to recycling companies, this also will decrease the environmental impacts associated with producing these wasted products. Also, it will gather data from the collected waste which will be beneficial in waste management planning and the recycling industry.

PROTOTYPE DESIGN

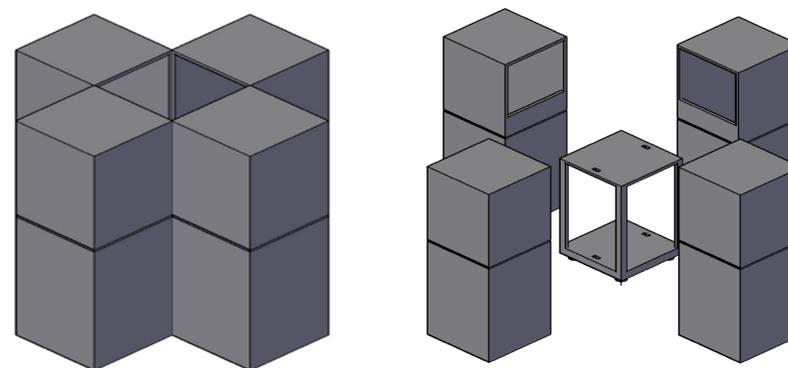


Figure 1: Bin model

Prototype is divided into 3 parts:

- 1-The bin: it consists of 4 bins and a table made of MDF wood. The wood in each unit is joint together using nails and each unit is dependent (the units are not connected by nails)
- 2- The plate:
- 3- Raspberry Pi 4 which is the computer that runs our trained model for classification.
- 4- a camera that is equipped along with the raspberry pi working both are working collaboratively to accomplish classification task.
- 5- Arduino which is the core source of running our sensors.



Figure 2: Physical prototype

TESTING

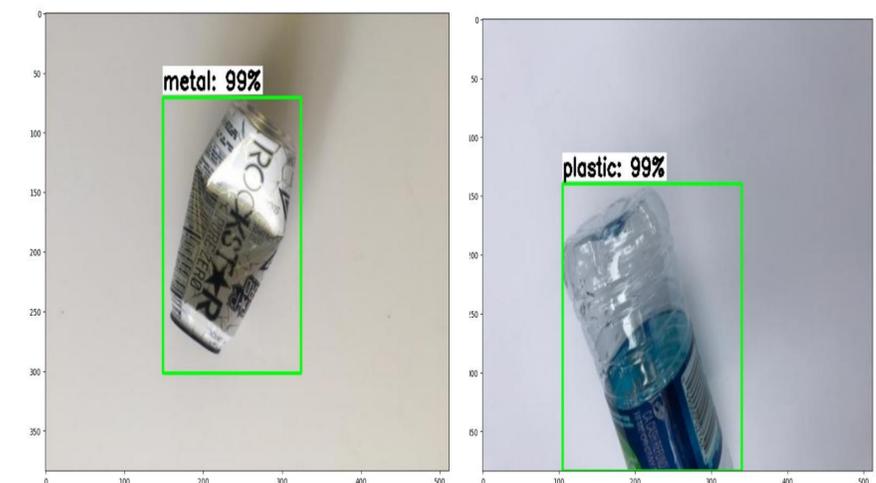


Figure 3: Object type identification

The trained machine learning model were able to identify the object category using the photo imported from the camera. Also, we were able to move the servo motor based on the identified category. For the sorting plate, it was tipping over and we were not able to fix it in place. Because of that, we made a base that allow the servomotor to rotate the plate and prevent it from going out of place

CONCLUSION

In summary, Smart sorting bin system sorts wastes restaurants using machine learning computer vision to accurately sort waste into glass, plastic, metal, and paper bins. It will promotes recycling and will reduce environmental impact associated with the manufacture of these products. Also, it will collect and analyze data that is beneficial to the recycling and waste management industry.