Automatic Sorting Trash Bin

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Abstract--This project aims to develop the automatic sorting trash bin to make garbage sorting more effective. There are mainly five parts in this bin: microprocessor, cover, camera, motor and screen. In research, machine learning is used to identify different objects, combining OpenCV with the mechanical structure to make garbage classification a reality.

Introduction

This survey is conducted targeting 40 Liverpool university students.

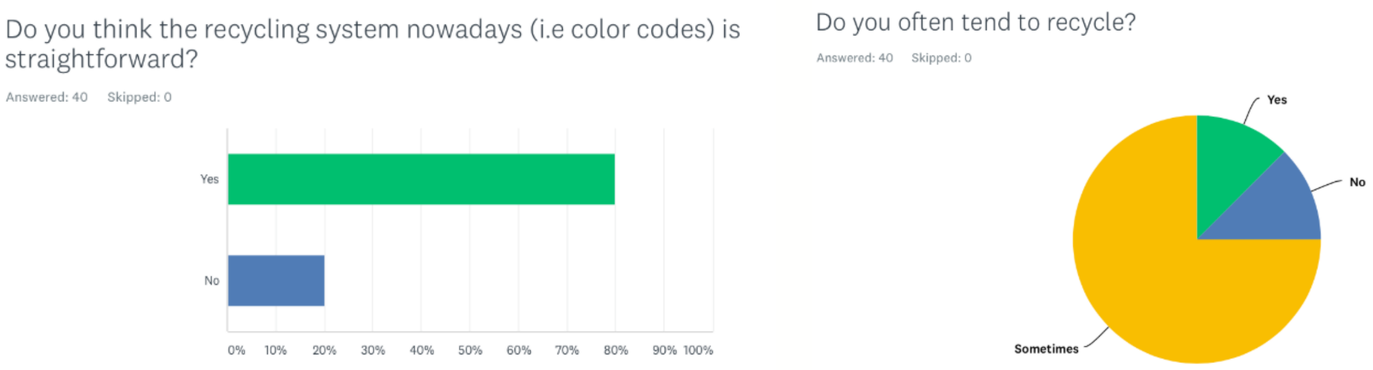

Figure 1. Partial Survey Result

According to the graphs, it is shown garbage sorting system needs to be improved. The purpose of this project is to reduce the cost of garbage disposal. This project uses machine learning technology, and the mechanical rotation of the servo to achieve effective garbage sorting into four categories which are bottle, can, paper and general waste.

Methodology

For software, the image recognition based on machine learning. Inception-v2 is used and image classifier is retrained [1]. The OpenCV is used to process images from the camera. For the hardware part, the trash bin uses two plates crossing rotation.

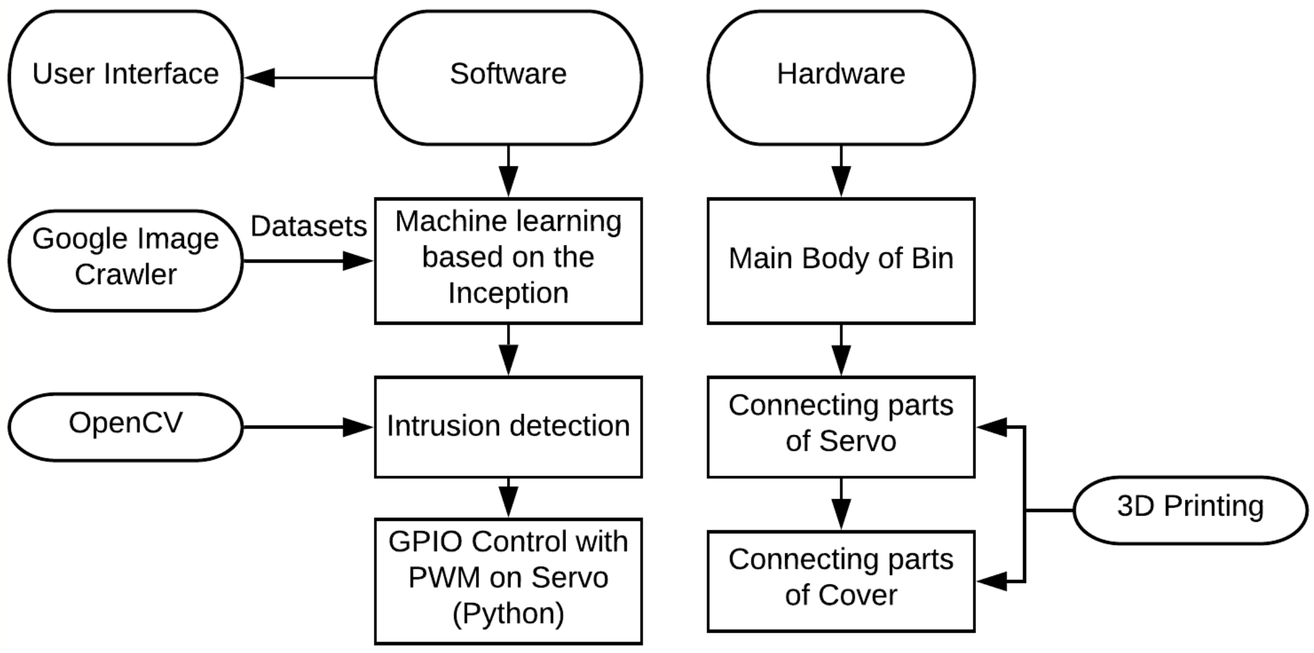

Figure 1. Main Methodology of Project

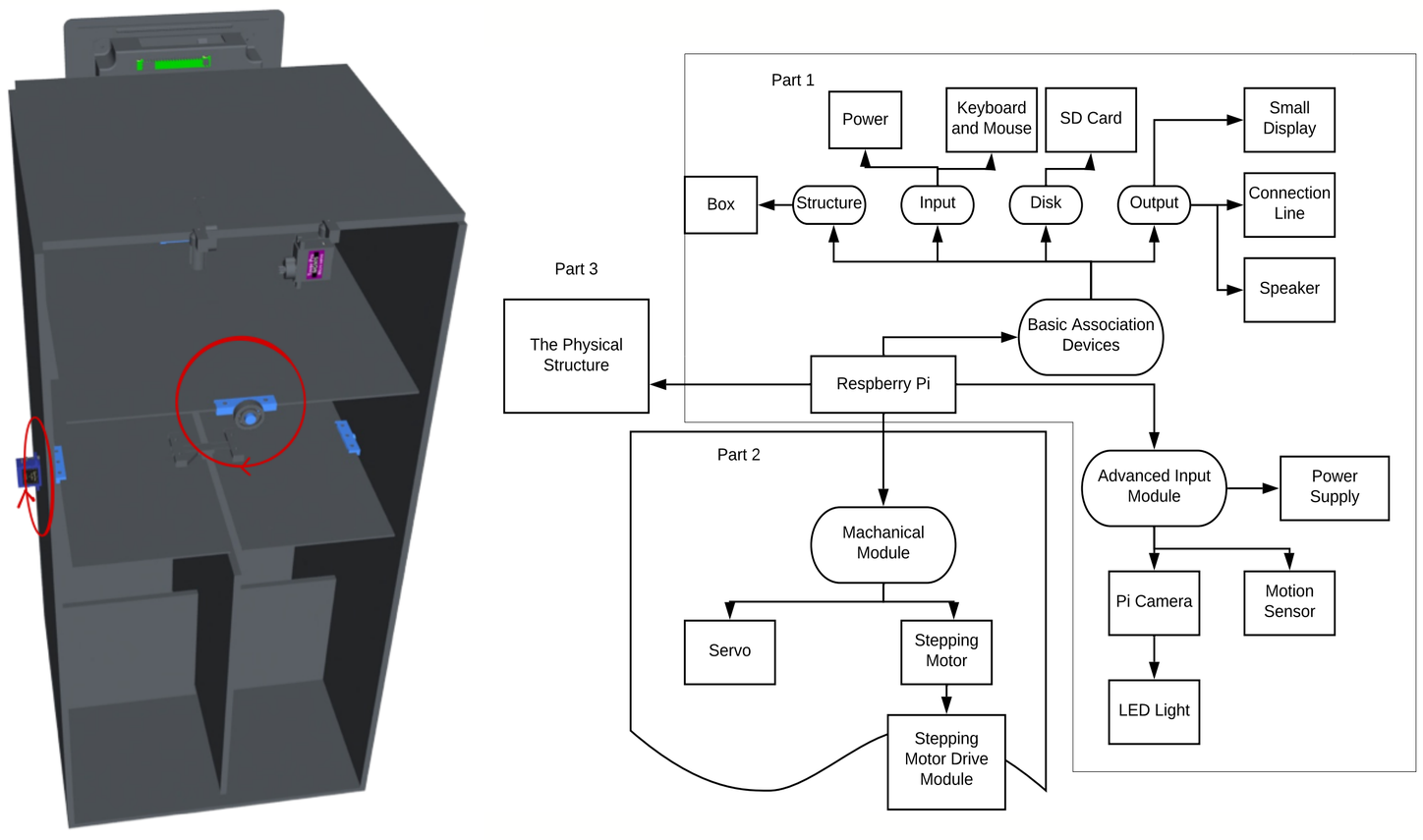

Figure 2. Garbage Bin Structure And Design Module Diagram

Objective

Rubbish can be effectively sorted out into four categories: plastic bottles, wastepaper, cans and general waste. The recognition accuracy is no less than 80%.

Figure 3. Activity Diagram And QR Code

Result

The automatic sorting bin can identify and sort out the trash in the right part. For the weight greater than 2kg, the sorting system may fail due to the excessive torque.

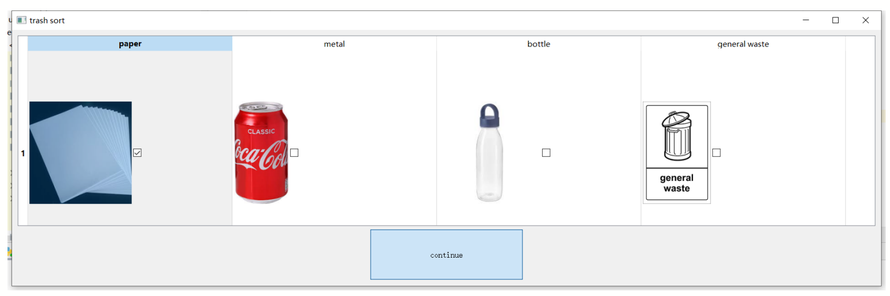

Figure 4. User Interface

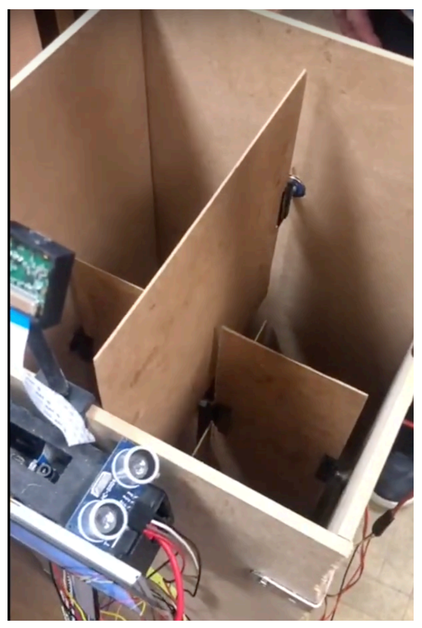

Figure 5. Final Project

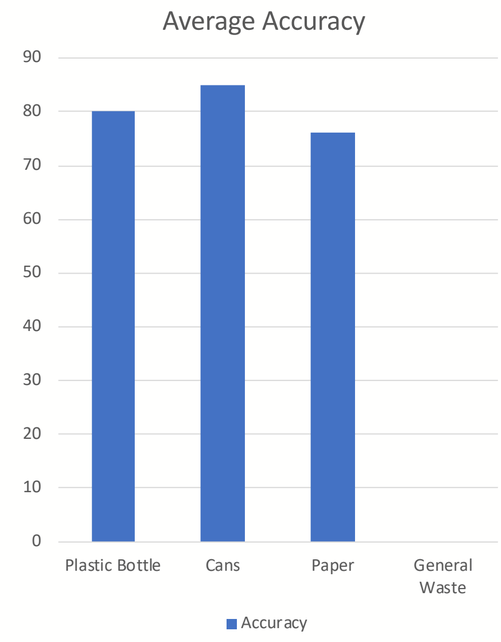

Chart 1. Accuracy of Sorting

Conclusion and Future Work

This project shows that it is feasible to use machine identification technology for garbage sorting. Still, the accuracy of algorithm needs to be improved. For the future development of the project, equipment cost control and social promotion of automatic waste classification are needed to be done in the future.

Reference

1] "TF Hub for TF2: Retraining an image classifier." [Online]. Available: https://colab.research.google.com/github/tensorflow/hub/blob/master/examples/colab/tf2_image_retraining.ipynb#scrollTo=oYM61xrTsP5d.