Garbage Collector

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Outlines

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Introduction

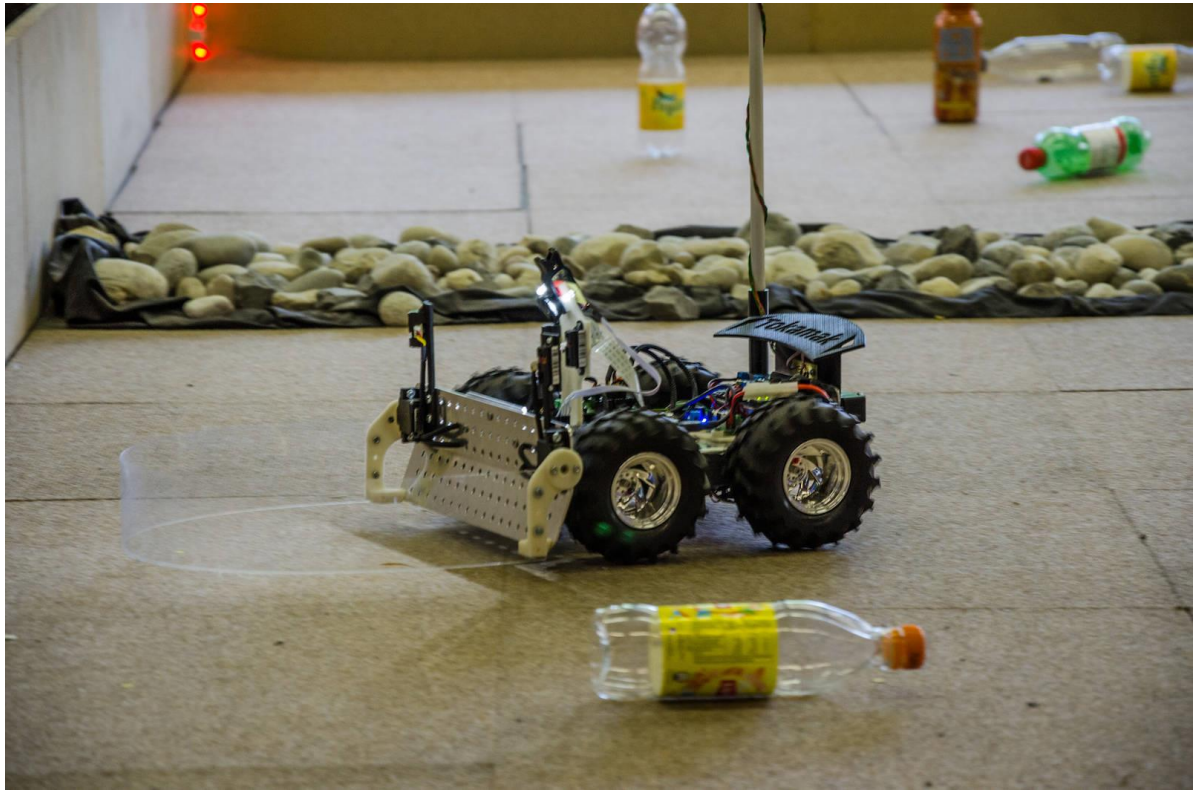
- **Garbage Collector is a robot that scans a small closed area, collects unwanted objects and searches for rubbish bin to park beside it when it finishes.**

- **The robot has rubbish bin so it can collect multiple items**

- **The objects can be chosen and make the robot recognize them.**

Literature Review

- **The project for STI interdisciplinary robot competition which was done in June/2014.**
- **The project about a robot with a mission to collect a recyclable bottles in an ideal environment.**
- **They used a very large arm which helped them to exceed the problem of the accuracy of positions.**



STI interdisciplinary robot competition

STI interdisciplinary robot competition

Robot Design

The project contains three main components:

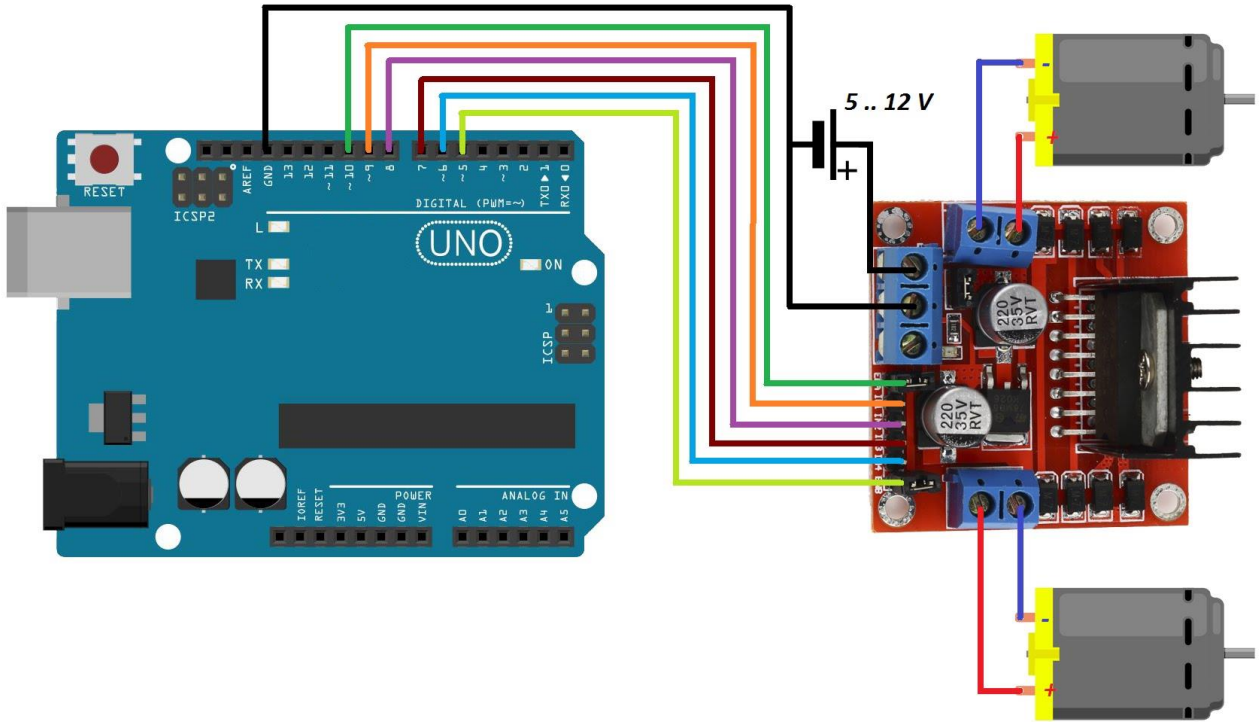
- **Tank with two DC motors which are controlled using Arduino**
- **Robotic arm with gripper which also controlled by the Arduino**
- **PiCamera and Raspberry Pi 2 for Image Processing**

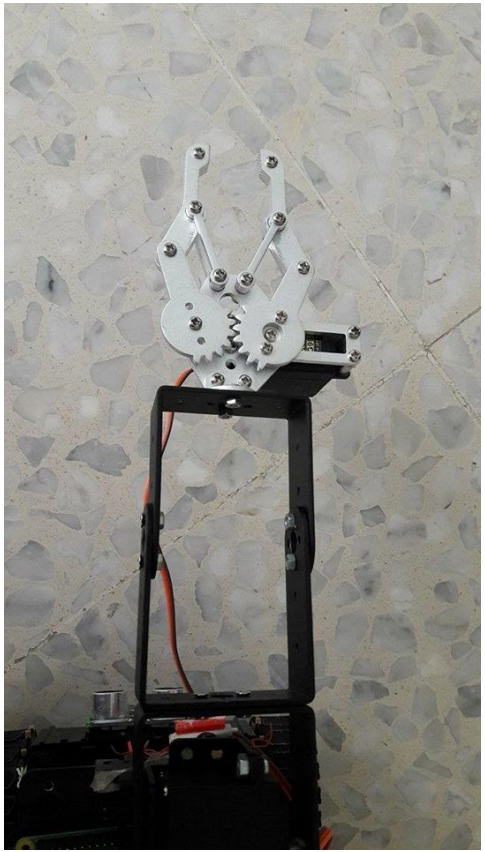
Arduino Microcontroller

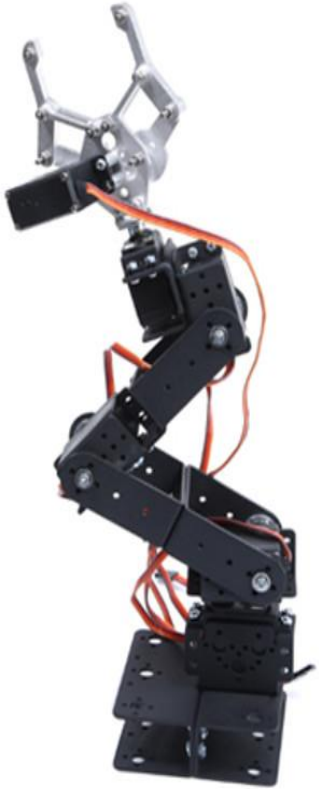
We used Nano Arduino to control:

- **The two DC motors of the tank**
- **The Servo motor of the arm**
- **The Servo motor of the gripper**
- **Ultrasonic**

Tank with two DC motors


5 .. 12 V
RESET
ICSP2
DIGITAL (PWM=~)
UNO
ON
TX
RX
ICSP
POWER
ANALOG IN
220
35V
RVT
220
35V
RVT

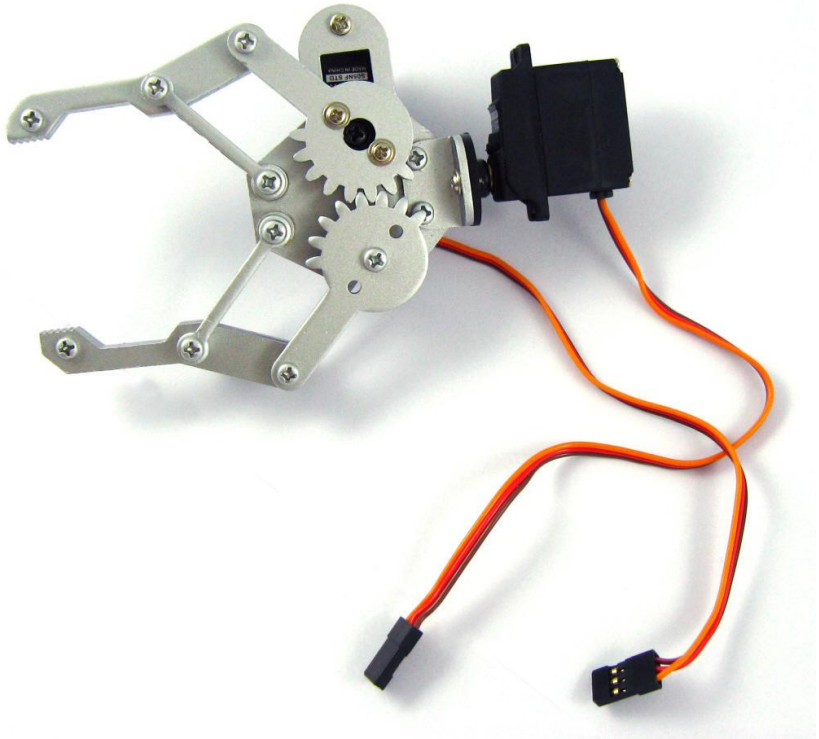


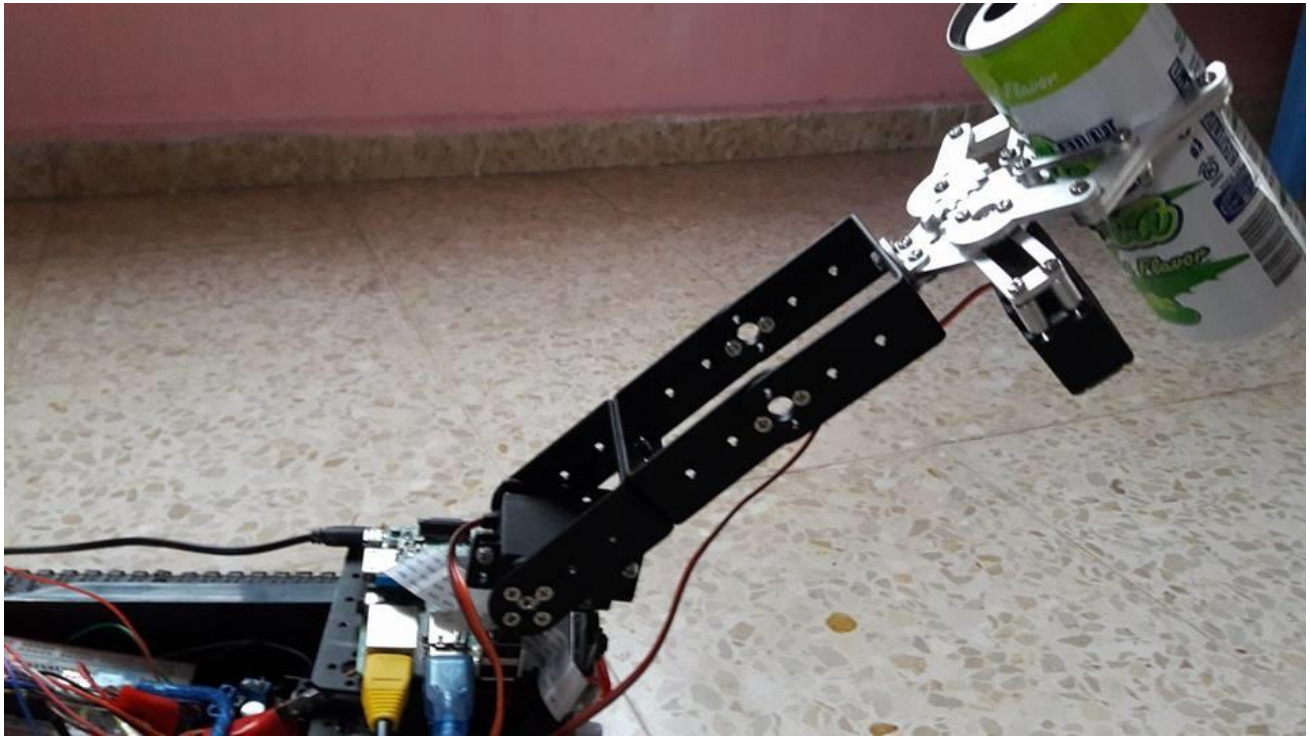


Robotic Arm

Gripper

- Which had a servo motor as a main part
- Could move from 0 to 180 to
- Catch the object and drop it in the basket





PiCamera and Raspberry Pi

- PiCamera used to capture images in order to detect the object
- Raspberry Pi 2 used to process the images
- The result then sent serially from the Raspberry to the Arduino.

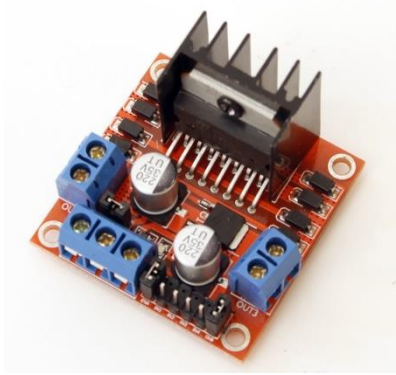
Image processing Algorithms

Haar Cascade Classifier	Feature Matching (SIFT)
Training	Descriptors
For recognizing just one object need from 10-15 hours	_____
Faster while processing	Slower
Changing size affect the results sometimes.	Does not Affect.
Less accurate results.	More accurate results

Other Components

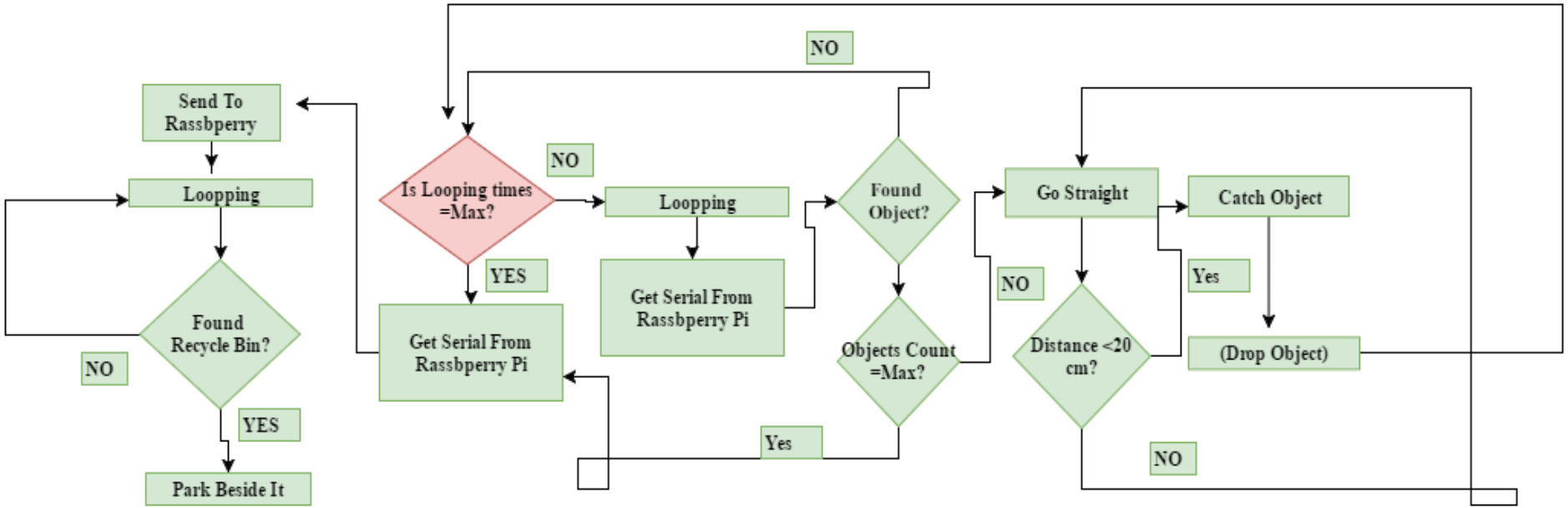
UltraSonic

Regulator



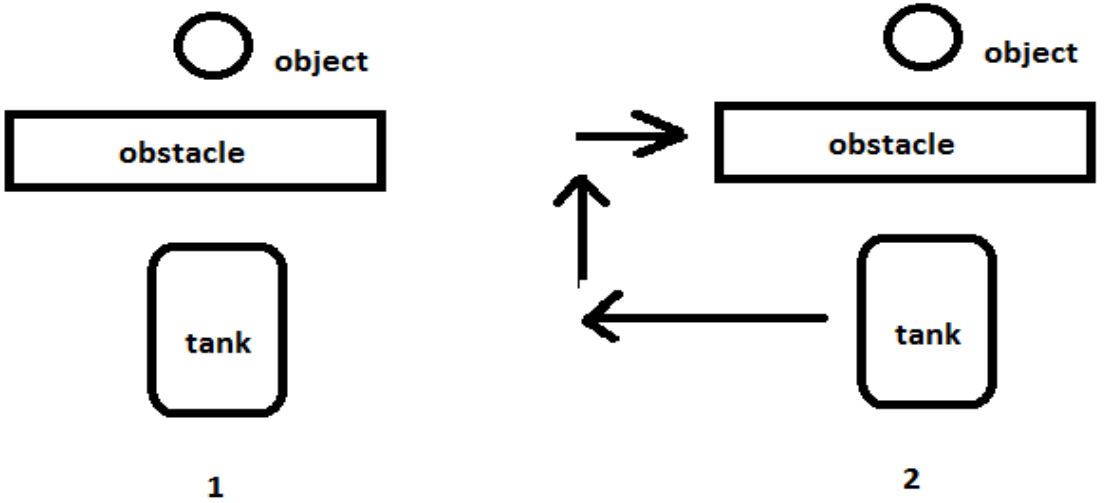
H-Bridge

Flow Chart


Send To Rassbperry
Loopping
Found Recycle Bin?
NO
YES
Park Beside It
Get Serial From Rassbperry Pi
Is Looping times =Max?
NO
YES
Loopping
Get Serial From Rassbperry Pi
NO
Found Object?
Objects Count =Max?
Yes
NO
Go Straight
Distance <20 cm?
Yes
Catch Object
(Drop Object)
NO

Uncompleted Functionalities

- Avoiding Obstacles



Uncompleted Functionalities

- **Adjusting the object with arm.**


output
Original Flavor
BLU
Aloe
Vera

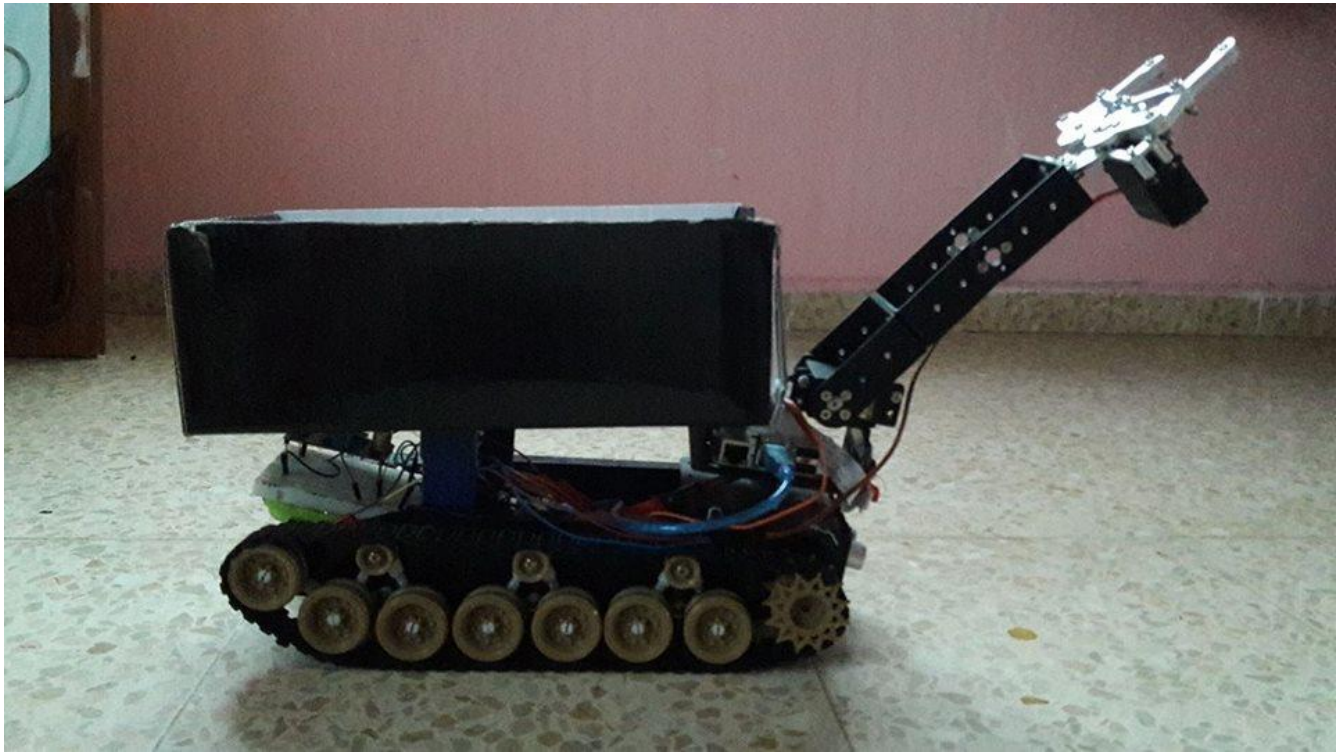

output
Original Flavor
Aloe
Vera
Original Flavor

Constraints

- The Availability of some hardware components
- Image Processing inaccurate results.
- DC motors inability to get to accurate position.
- Can’t find one power supply that could feed the whole circuit.

Results

- We ended up with a robot that can scan the region and find multiple objects (tested for two) then search for recycle bin to park beside it
- Find the objects not completely accurate



Future work

- Use Stepper motor instead of DC motor
- Add other motors to the arm
- Improve image processing algorithm

Thank you

Any Questions ?