Topic: Alternative Design For Automatic Cutlery Sorting Machine

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OBJECTIVE

To design and prototype a compact, UV-sanitizing cutlery sorting machine that:

- Enhances public confidence in cutlery hygiene.
- Automates the sorting of forks and spoons.
- Provides a safer, more efficient alternative to traditional cleaning methods.

PROBLEM STATEMENT

Problem Statement

Current methods for cleaning and sorting cutlery in cafeterias and restaurants are:

- Time-consuming.
- Inefficient for large-scale use.
- Lacking additional sanitization beyond traditional cleaning.

Cleaning method

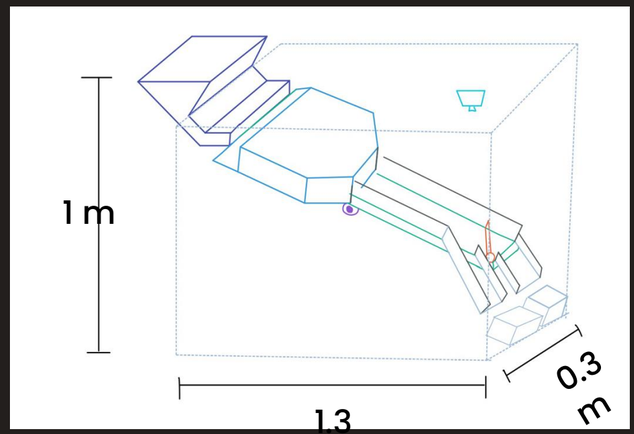
Cafeteria at department store

Sorting spoon and fork

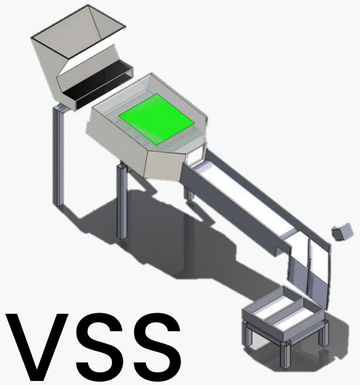
Cafeteria at Thammasat university

Proposed Solution

- Automate cutlery sorting and disinfection using UV-C technology.
- Design a compact, easy-to-use machine for cafeteria and restaurant settings.

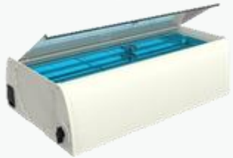


SYSTEM LEVEL DESIGN



UVSS

Conveyor



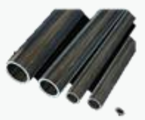
UV

Storage

Belt

Motor

Raspberry Pi board

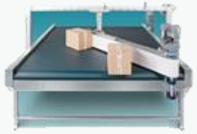


Rolling pipe

Germicidal Lamp

Polycarbonate

Camera

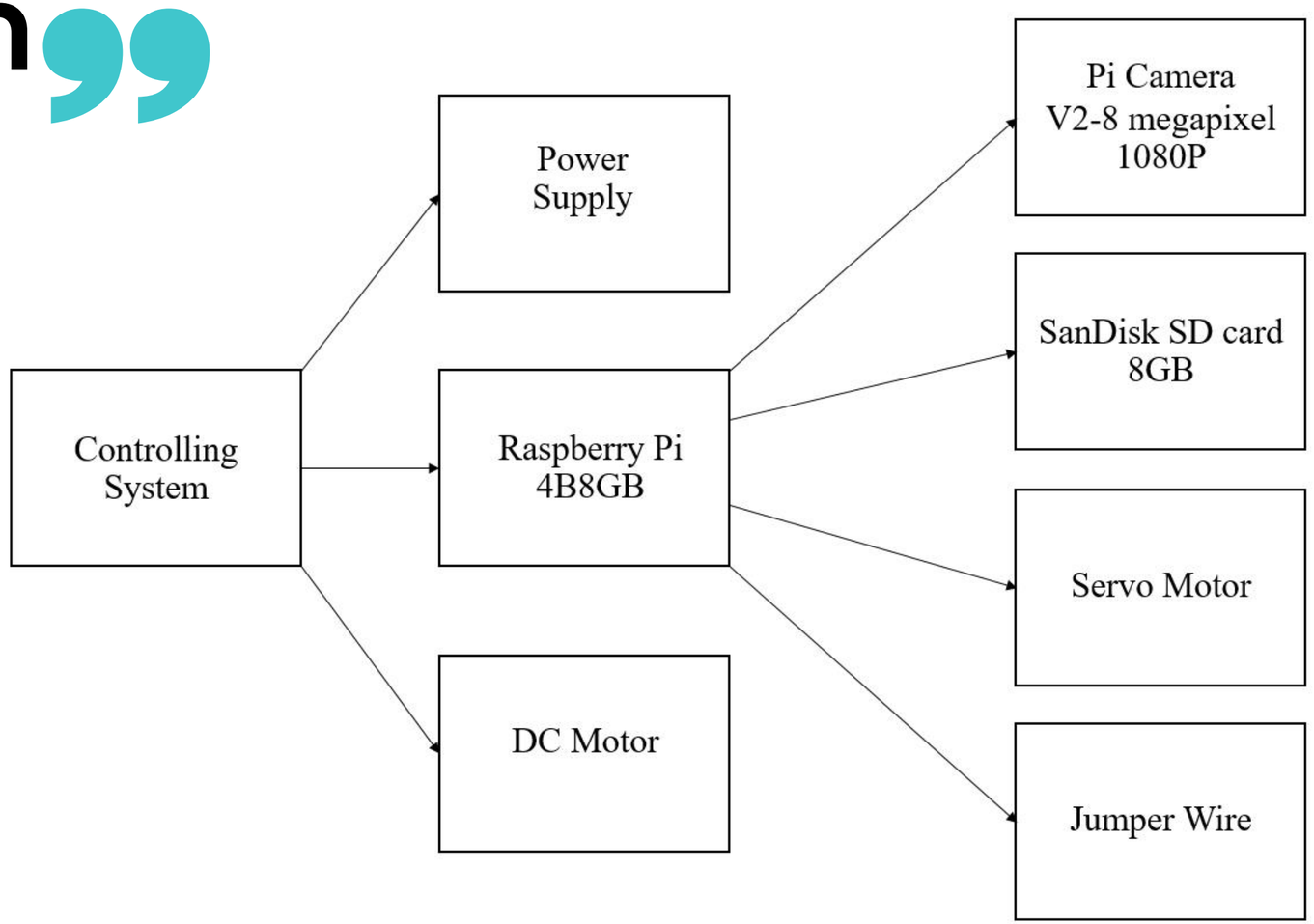


Divert mechanism

HDPE sheet

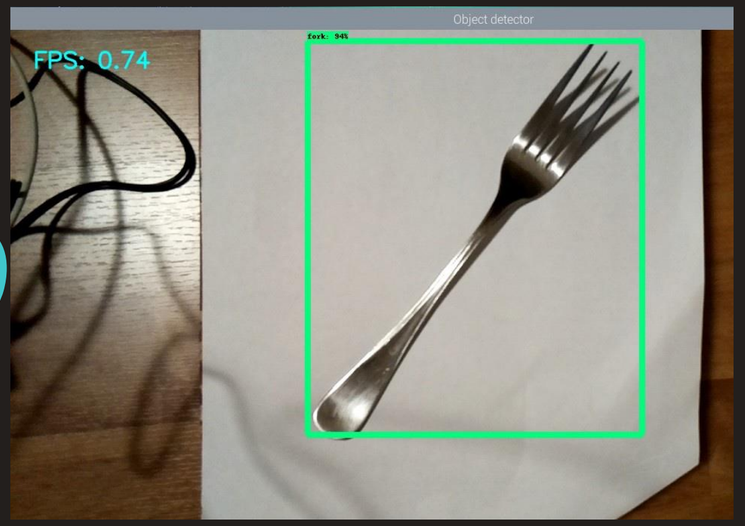
Motor

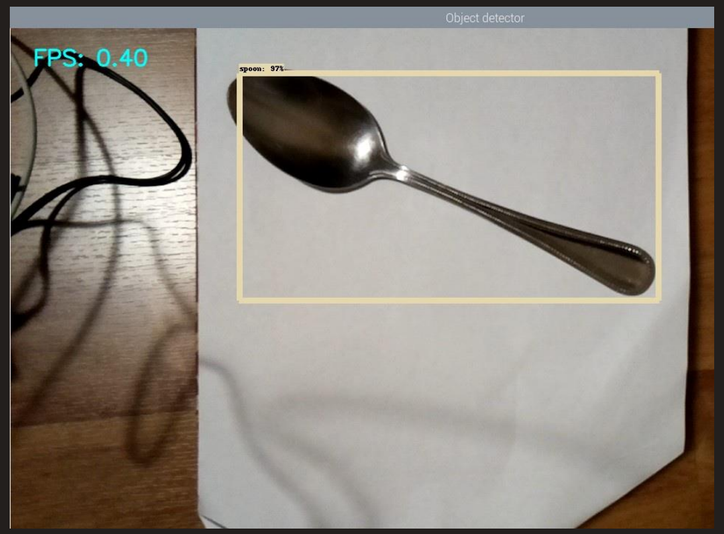
Controlling System



Concept Development

Prototype





pi@raspberrypi: ~/tensorflow1/models/research/object_detection

File Edit Tabs Help

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Turning back to 0 degrees
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class_name=spoon, scores=0.9261555671691895
turn servo right
Turning back to 90 degrees for 2 seconds
class_name=knife, scores=0.8265562653541565
class_name=fork, scores=0.928337574005127
turn servo left
Turning back to 0 degrees
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turn servo left
Turning back to 0 degrees
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turn servo left
Turning back to 0 degrees
class_name=spoon, scores=0.9502094984054565
turn servo right
Turning back to 90 degrees for 2 seconds
class_name=spoon, scores=0.9877882599830627
turn servo right
Turning back to 90 degrees for 2 seconds
class_name=fork, scores=0.9024389982223511
```

“Concept Development”

Conceptual Design

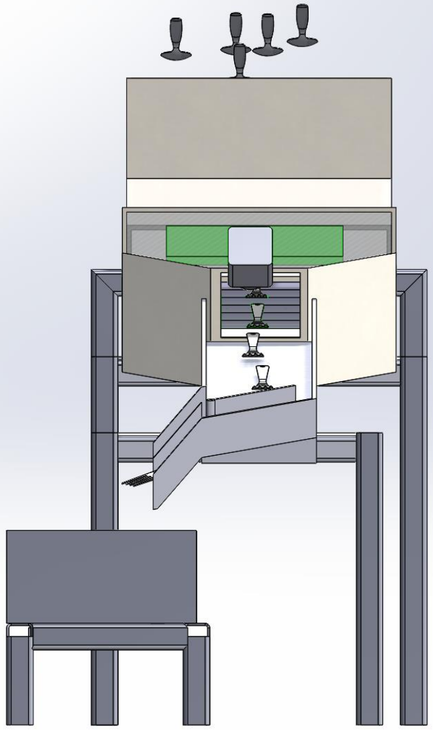
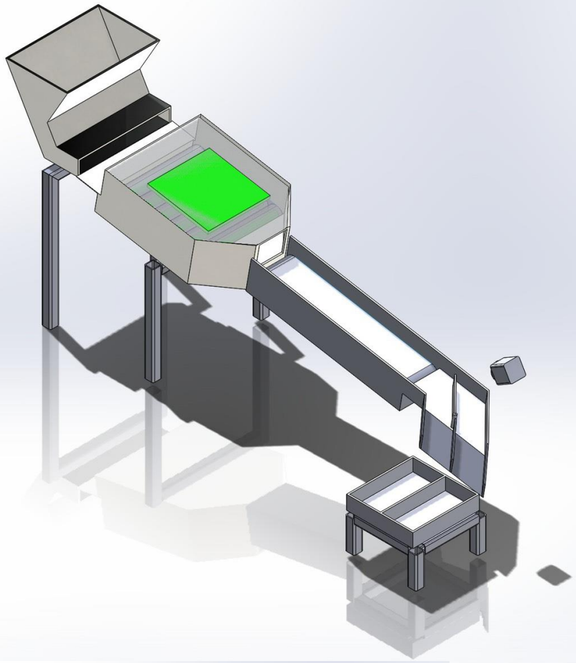
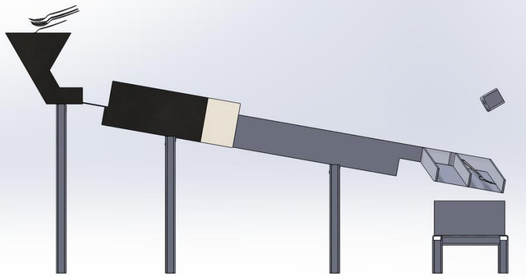
Detailed Design

FORM

- **Color** - Light and bright color
- **Shape** - Universal design concept
- **Size** - Compatible size

FIT

- Alignment
- Easy to access

FUNCTION

- Cleaning
- Sorting
- Easy and ready to use
- Closed system