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Electrical & Computer
Engineering

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Customer_____Ben Cootner_____
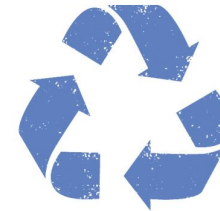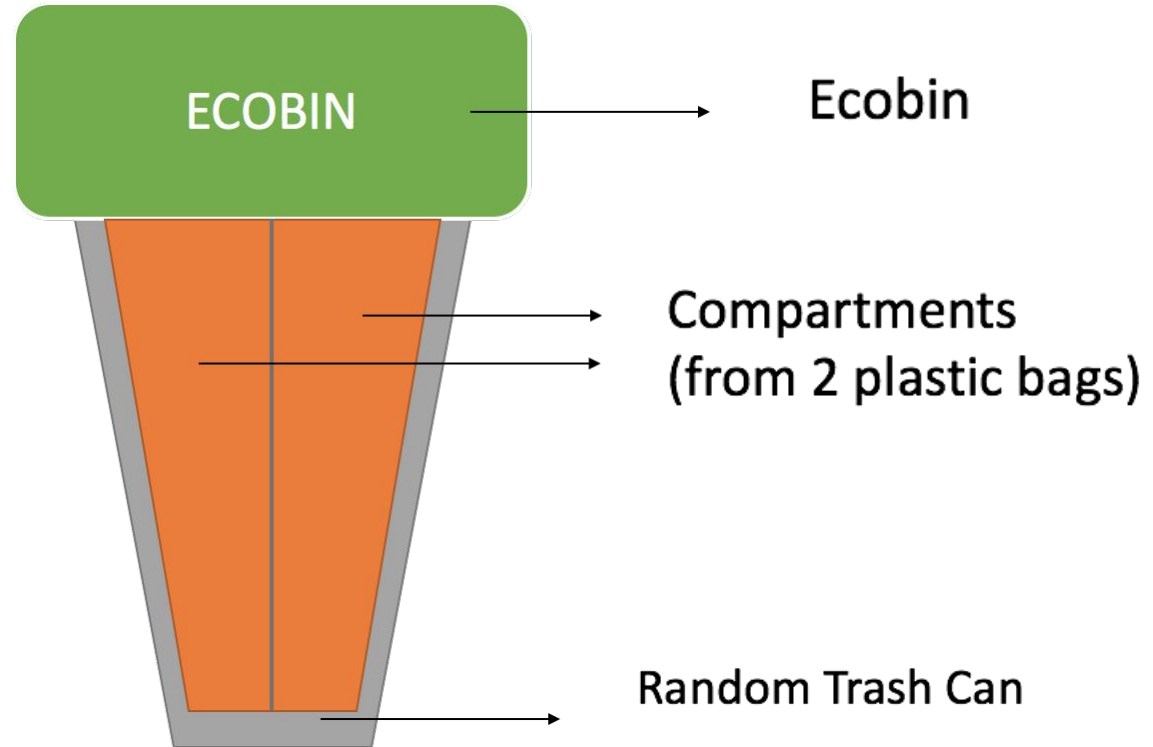
Problem Statement

- About **80% of what Americans throw away is recyclable, yet our recycling rate is only about 30%**.
- The **world leader in recycling, Switzerland, only recycles about 52%** of its waste.
- Seattle recycling center, workers sort **550 tons** of trash a day.
- Saves a lot of money and manpower if done electronically
- Reduces the "Ick-factor"

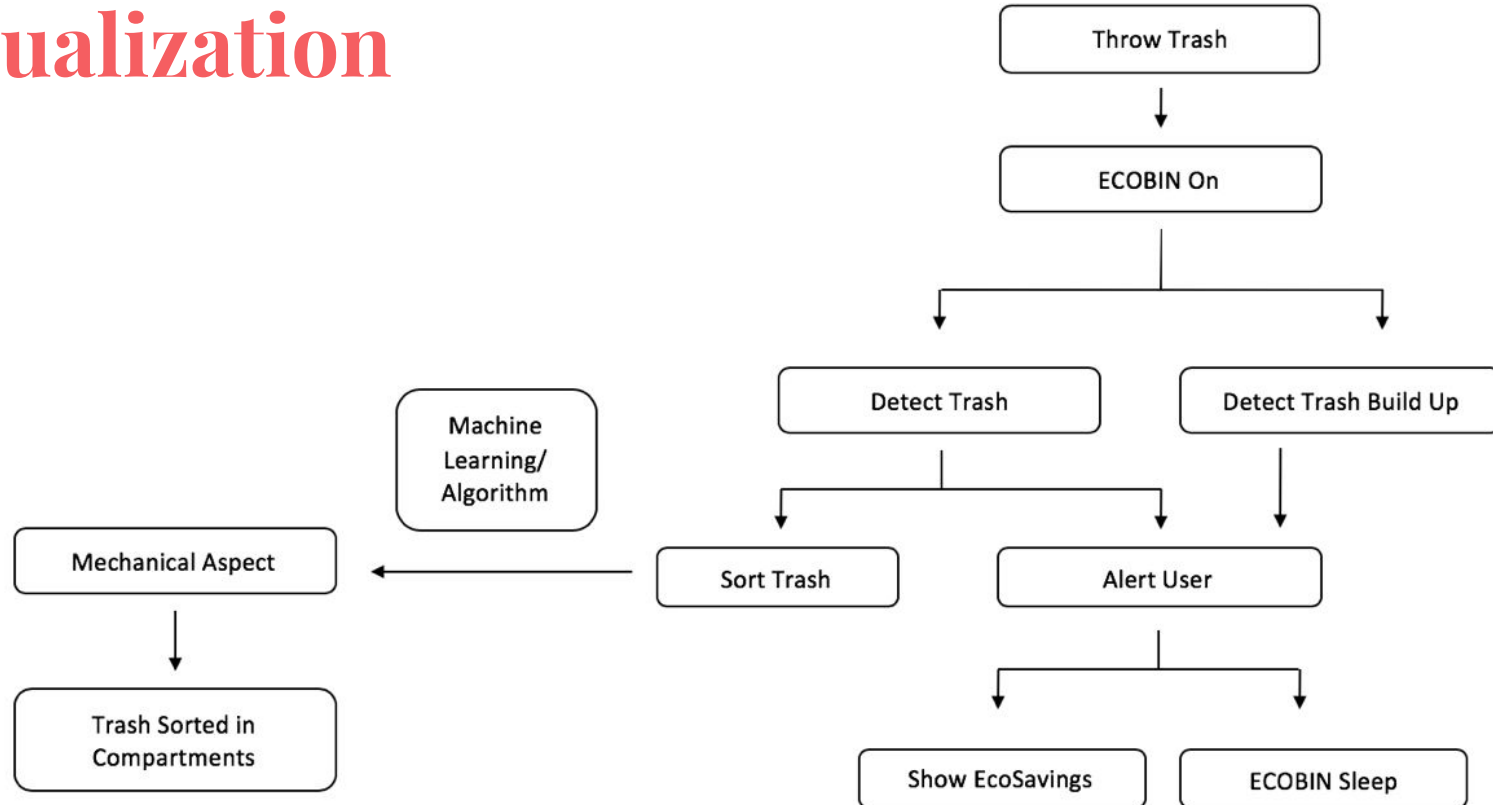Boston University
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Visualization

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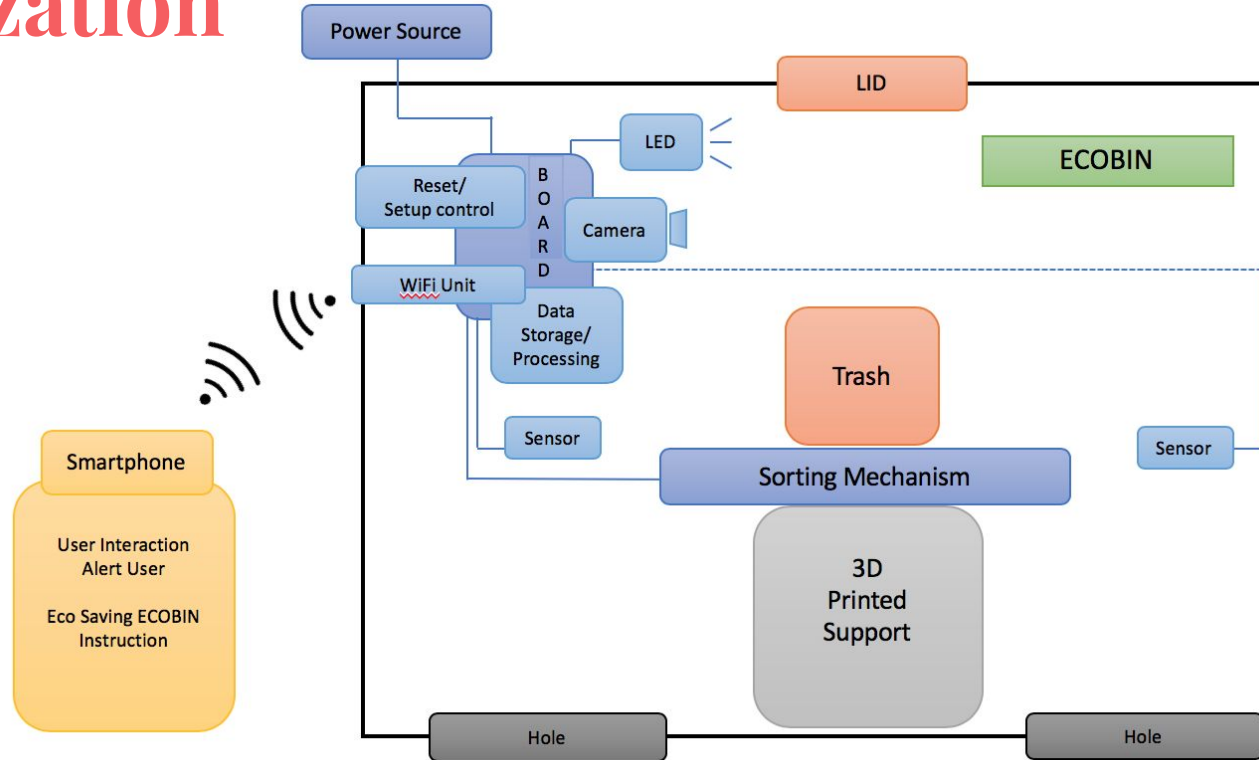
Deliverables

- Device that classifies waste (recyclable vs non-recyclable)
    - Sensors
    - Object detection
    - Mechanical aspect
- Mobile Application
    - Database
    - User recycling index
    - User Interaction

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Objectives

- Object Detection - detect/classify waste to recyclable/non-recyclable
- Detect Trash Build Up - detect if trash can is full
- Alert User - user interaction
- Sorting Mechanism - mechanically powered seesaw,conveyer belt,etc
- Low Power - minimum power consumption
- User Friendly - easy to use
- Safe - should not use ada hazardous/dangerous materials
- Practical - product should be simple and be within the budget

Pairwise Comparison Table

Objectives	Object Detection	Detect Trash Build Up	Alert User	Sorting Mechanism	Lower Power	User Friendly	Safe	Practical	**Score**
Object Detection	…	1	1	1	1	1	0	1	**6**
Detect Trash Build Up	0	…	1	0	1	1	0	1	**4**
Alert User	0	0	…	0	1	1	0	1	**3**
Sorting Mechanism	0	1	1	…	1	1	0	1	**5**
Lower Power	0	0	0	0	…	1	0	1	**2**
User Friendly	0	0	0	0	0	…	0	1	**1**
Safe	1	1	1	1	1	1	…	1	**7**
Practical	0	0	0	0	0	0	0	…	**0**

Morph Chart

Functions	Possible Means		
Object Detection	Camera	Infrared	Motion Detection
Detect Trash Build Up	Ultrasonic Sensor	LIDAR	Infrared
Alert User	Mobile Application	Web based Application	SMS Text
Sorting Mechanism	Conveyer Belt	Mechanically powered seesaw	Robotic Arm

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Constraints

1. False positives vs False Negatives
2. Energy Consumption - Depending on type of system constructed, energy consumption will vary
3. Economic Constraint - Product has to meet the required budget
4. Ergonomic Constraint - Need to be as hygienic as possible. Need to be usable for a variety of trash cans
5. Degree of Accuracy: Banana inside plastic bag? Batteries? Set boundary.

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Direct Competing Technologies

Oscar

What they do:
Sort into 2 broad categories: recyclable or trash

What's missing:
- Specific kind of trash sorting - plastic,clothes,etc..
- Can only throw one thing at a time
- Not customizable to current trash cans

Trash Bot

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Questions?