

Problem Statement: As per 2013 EPA (Environmental Protection Agency) study, an average American wastes about 4.4 lbs of materials per person everyday. Majority of the recyclable items are filled in landfills. Based on our research, there is no distinct product that can identify all types of recyclable items with appropriate prompts to avoid intermix of trash and recyclable items.

Objective:
Efficiently segregate recyclable items from trash to save energy and the environment.

Engineering Design Process:

- ASK:** Durability of the device, condition of recyclables. Recycling can save a lot of energy.
- IMAGINE:** We considered 3 solution approaches & shortlisted option designed a device to identify recyclable items thrown into a trash bin with a lid.
- PLAN:** Design & development of a device with 3 modules - Metal Detector, Motion detector & display panel.
- CREATE:** Implement above 3 modules. **TEST REQUIREMENT:** Did the unit test for each module separately and captured the test results for the following scenarios.
- IMPROVE:** Infusing the prototype will be enhanced for plastic, cardboard, paper, and glass.
- SCALE SOLUTION:** The key strength of the current prototype model is uniqueness of the product to deliver various capabilities like metal detecting, LCD display, and auto lid open/close.

Fact:

- Recycling 1 ton of plastic can save an equivalent of 2 people energy for 1 year
- Manufacturing products from recycled paper and plastic reduces water pollution by 35% and air pollution by 75%
- One plastic bottle can save enough energy to power a 60 watt light bulb for 6 hours
- It takes about 25 recycled bottles to make a fleece jacket

CONCLUSION: After conducting the Design Flow Analysis, on three designs, we chose a device to identify recyclable items while throwing them in the trash bin with lid as the best.

- Improves efficiency of recyclable items identification
- To identify metal items with LCD display panel/buzzer prompting, and auto lid open/close functionality

RECOMMENDATIONS:

- Can be enhanced to paper and plastic.
- Notify user's phone with recyclable data is nice to have infuse

SUPPORT MATERIALS:

- For prototype layout and flow diagram, please refer to figure 1 and 2
- Arduino code reference: <https://github.com/venkharri/venkharri>

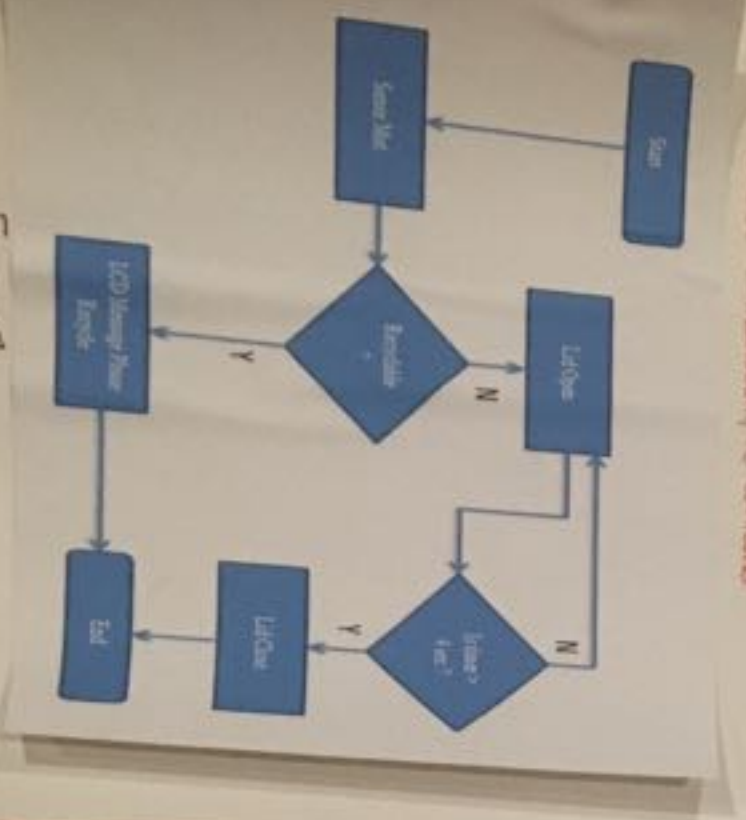


Figure 1



- Metal Detector (Inductive Proximity Sensor)
- Motion Detector (Ultrasonic Sensor)
- Display Panel (LCD - Liquid Crystal Display)



Reduce landfills, Use R³ device, to save the environment