ECO-FRIENDLY ON
~ THE DUSTBIN ROVER ~

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A Values in Action Project by:
In Collaboration with:
Supported by:
NATIONAL CONCERNS…

The scene after the 2015 Laneway Festival was held at the Meadow at Gardens by the Bay
Source: The Straits Times, 28 January 2015

“It takes continuous effort to keep Singapore clean. We need to progress from being a cleaned city to a truly clean city. All of us can play a part – picking up our own litter, educating our children and grandchildren, and reminding others to do the right thing.”
~ Mr Lee Hsien Loong
Our Approach: Design Thinking

The Design Process
1. Discovery
2. Interpretation
3. Ideation
4. Experimentation
5. Evolution
Stage 1: Discovery
Visit to City Square Mall
23 April 2015

- Talk by CSM representative on the eco-mall’s green features
- A learning journey around the mall to see how some of these are implemented in the mall
From the learning journey and observations made, we went through a **Brainstorming** phase to think of ways to help improve on some of their existing solutions that were shared and to further develop on our ideas.

“**How might we…**” questioning technique is used as a guide to focus on the improvements.
We made another trip to CSM on 10 July 2015 for an **Interview Session** with CSM’s management board to find out more about the operational procedures, waste management and the general cleanliness of the mall.
Question 1: How does CSM track whether consumers use the respective recycling bins appropriately?

Answer:
- Checking of every bin collection is labour intensive and is not efficient.
- There is a central collection point for the bins.
- We ensure that not all 4 types of recycling bins are placed at the same spot.
- The amount of rubbish in each recycling bin allows the management to know where to place the bins in the mall. When they clear the bins, the amount of rubbish allows them to know whether the shoppers and tenants use the respective recycling bins.
Question 2: What are examples of litter/waste collected in the bins at CSM?

Answer:
- Mostly consumables e.g. cans, paper cups, tissue papers.
We carried out **Data Collection and Observation of Consumer Behaviours** over the span of an hour at various locations in CSM and the placement and location of the different bins were also noted.

Recycling bins found at the side and in front of the escalators.
From the data collected from the interview and the behavioural observations, it was concluded that:

➢ It is **not convenient for shoppers** to make their way to the locations of the recycling bins.

➢ Most shoppers **tend to throw their waste into the General Waste bins** instead of sorting it out.

➢ It is an **inefficient use of manpower** for the cleaners to frequently clean the bins (at least 3 times a day).
How might we improve the way customers dispose of their waste in the most convenient way?
Stages 3 & 4: Ideation & Experimentation

~Prototype Development~

* To maximise space, a stacking concept was done where the various litter bins were piled on top of each other

* However, limitations as to how much litter could be thrown into each bin and the combined weight of the bins might be too much for one rover to carry as the weight was not evenly distributed
Prototype Development

Stacking concept - Vertical, Horizontal Side-by-side concept with wheels

Using robotic programming for moving bin

Robot with magnetic tracks.
Prototype Development

The Bins

* To give visual impact to consumers when they throw the waste into the containers.
* Make it easier for consumers to know what needs to go into the bins.
* Help to educate consumers.

The bins are shaped as the objects / wrapped in the type of materials that they are receiving from the consumers.
Stage 3 & 4:
Ideation & Experimentation

This idea tries to find an alternative solution to the stacking method.
Prototype Development

Stacking concept side view

Improvised - Slanting bin
The **Dustbin Rover** is designed to follow a set route and move through a particular level in the shopping mall.

Through programming, it will move on the level and allow shoppers to throw paper, plastic, cans or general waste in the bins.

Compartment are created for different recyclable materials e.g. a circular opening means it’s for cans.
The roving bin should be:

- Chargeable (using concept of hybrid car)
- Able to last for at least the whole day
- Parked at charging station and be charged for next day’s use on a daily basis
- Waste collected at the bin collection point
* Having something that moves will capture the attention of the shoppers and arouse their interest to find out more or make an attempt to use it.

* Careful consideration in the management of the bin compartments e.g. different shapes and sizes of the holes to throw the different types of recyclable materials into.
Impact

* It is feasible to use the roving bin in many public areas, particularly in shopping malls as it requires only a sensor line to be run through the designated areas for it to move about as well as a docking station.
Information printed on the bin can help to raise environmental awareness (recycling) for all and promotes proper disposal of waste into the correct bin compartment.
Impact

* Targets different age groups:
  - the young through its vibrant colours and the element of fun (different slots)
  - the elderly as the bin’s mobility helps make it more convenient for them. The stop button also gives time for them to be able to dispose their trash at their own pace
To further refine and make improvements on the idea, the bin could:

- Give out a signal to trigger that the waste collected has reached its optimum and needs to be emptied.

- Have a Stop button for the consumers to press when they want to use the bin. The Stop button can also be used in case of emergencies.
Stage 5: Evolution

- To save energy, the bins can be programmed to take a 10-minute break at allocated stop points.
- Shape the bins in a more creative way.
- Design the bins to navigate stairs [use of triangular-shaped wheels] similar to that of portable trolleys.
Thank You