SmartCan

Make your life easier

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Group Members :
卢泽宇，谢济宇，陈科宇

Outline

南方科技大学
SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

1.Background

3. Preliminary investigation

2.Concept idea

4.Prototype

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Background

- A trash can is a container for temporarily storing waste, and is usually made out of metal or plastic.

https://ru.pinterest.com/pin/381961612122146983/

Background


1


2


3

1: https://ru.pinterest.com/pin/381961612122146983/
2: ®世家12l
3: https://ru.pinterest.com/pin/381961612122146983/

- Traditional trash can use manpower to unseal which is inconvenient and unsanitary.
- Trash can odors have a way of drifting from room to room, and the whole house can be smelled like rotten eggs.
- Bad smelling garbage isn't just an annoyance -- it can also attract bugs, flies, mice, and rats.

Background

Comparison

- 网状垃圾桶

优点：便宜造价低；

缺点：易漏水，异味大、夏天的时候容易滋生病菌、招来昆虫。

- 脚踏式带盖垃圾桶

优点：有盖子，异味不溢出，无需弯腰；

缺点：多由塑料制成，结构容易损坏，重心不稳，容易倾倒。

- 翻盖式垃圾桶：

优点：常见于公共场所，比较封闭；

缺点：翻盖容易脏，容易招引爬虫。

- 红外感应自动开盖垃圾桶：

优点：现代科技产物，集合多种优点如自动开盖等；

缺点：需要电池供电。一旦电子原件故障或者电池没电，垃圾桶就成了摆设，不能再正常使用。

1: ®得力(deli)9189 稳固高品质铁网圆纸篓
2: ®柏德汇BH-031系列9L脚踏垃圾桶
3: https://ru.pinterest.com/pin/381961612122146983/

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Concept idea

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The SmartCan Design

- Auto-opening& closing
- Automatic Bag Replacement
- Auto-sealing
- Insect Pest Control

Concept idea

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Auto-opening &closing

Automatic Bag Replacement

Auto-sealing

Insect Pest Control

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Customer needs

Preliminary investigation

Industry metrics

Customer needs

Preliminary investigation

Industry metrics

Customer needs

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	Customer Statement	Interpreted Need	Ranking
1	It should be affordable.	Affordable	5
2	My hands won't get dirty when touching the trachcan.	Cleaness	4
3	There shouldn't have much insects in the smartcan.	Cleaness	2
4	It must be well sealed when it is not being used.	Cleaness	4
5	It should easy to be clean without blind corner.	Cleaness	3
6	The risk of circuit-short-to-fire should be zero.	Safety	3
7	artcan should not have sharp corner in order to keep human and pets	Safety	4
8	People won't get hurt when the smartcan is auto-closing/opening	Safety	3
9	It should be able to control by human.	Convenience	4
10	Stable enough and won't easily fall down.	Convenience	4
11	Trashbag should be easy to reneal.	Convenience	4
12	It should be opened long enough to throw trashes.	Convenience	3
13	It can be easily moved.	Convenience	2
14	Easy to repair or replace the broken parts.	Quantity	3
15	It is in a good quantity and won't be able to damage so easily.	Quantity	4
16	It should be able to contain much trash.	Capacity	4
17	It save the energy.	Energy efficiency	2

Customer needs

Preliminary investigation

Industry metrics

Industry metrics

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Number #	Need #$	Metrics	IMP		Units
1	1	成本	5		¥
2	2\5	垃圾桶桶口面积	4		cm^2
3	2\11	感应距离	4		cm
4	3	关闭时垃圾桶内外空隙大小	3		cm^2
5	6\17	电机功率	3		w
6	7	最大锐角棱角角度或最小钝角棱角角度	4		Degree
7	8	开盖时人手碰到桶盖最大受力	4		N
8	9	开合方式	2		\
9	10	封口时所需最小力	3		N
10	11	底面面积	3		cm^2
11	11	重心高度	4		cm
12	13	垃圾桶质量	3		Kg
13	15	桶盖材料刚度	2		N/m
14	15	外表面材料刚度	3		N/m
15	15	内部材料刚度	3		N/m
16	16	垃圾桶容量体积	5		L
17	17	开启时机构传动比	2		\
18	17	电池容量	4		mA·h
19	17	感应器功率	3		W
20		总高度	3		cm
21		开启时的噪音	4		dB

Industry metrics

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	Customer Statements	Metric	1 成本	2 垃圾桶桶口面积	3 感应距离	4 关闭时垃圾桶内外空隙大小	5 电机功率	8 最大锐角棱角角度或最小钝角棱角	9 开盖时人手碰到桶盖最大受力	10 开合方式	11 封口时所需最小力	12 底面面积	13 重心高度	14 垃圾桶质量	15 桶盖材料刚度	6 外表面材料刚度	7 内部材料刚度	16 垃圾桶容量体积	17 开启时机构传动比	18 小夜灯功率	19 电池容量	20 感应器功率	21 总高度	22 开启时的噪音	Metric	Interpreted Need	
1	有多种价格梯度，能够适合不同层次消费者																								Affordable	1
2	不会弄脏手，不会出现二次污染																								Cleaness	2
3	减少昆虫出入																								Cleaness	3
4	垃圾桶不用时处于一个完全封闭的状态																								Cleaness	4
5	易于清洁，没有清理死角																								Cleaness	5
6	不会发生短路着火等事故																								Safety	6
7	减少棱角，防止伤害到人或宠物																								Safety	7
8	自动开合时应该保证人的安全																								Safety	8
9	能够随时把垃圾扔进垃圾桶里， 没有不符合习惯的延迟现象																								Convenience	9
10	容易倾倒																								Convenience	10
11	可以方便地更换垃圾袋																								Convenience	11
12	应该设置常开按钮，人为控制垃圾桶桶口开合时间																								Convenience	12
13	垃圾桶底部有软垫或轮子，不花太大力气就能移动																								Convenience	13
14	垃圾桶组件应该方便更换，易于维修																								Quantity	14
15	垃圾桶结构牢固，不易破损																								Quantity	15
16	能够放置较多垃圾，垃圾桶空间利用率高																								Capacity	16
17	不需要耗费太多电力																								Energy efficiency	17

Industry metrics

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	Customer Statements	Metric	1	2	3	4	5	8	9	10	11	12	13	14	15	6	7	16	17	18	19	20	21	22
			成本	垃圾桶桶口面积	感应距离	关闭时垃圾桶内外空隙大小	电机功率	最大锐角棱角角度或最小钝角棱角	开盖时人手碰到桶盖最大受力	开合方式	封口时所需最小力	底面面积	重心高度	垃圾桶质量	桶盖材料刚度	外表面材料刚度	内部材料刚度	垃圾桶容量体积	开启时机构传动比	小夜灯功率	电池容量	感应器功率	总高度	开启时的噪音
1	有多种价格梯度，能够适合不同层次消费者																							
2	不会弄脏手，不会出现二次污染																							
3	减少昆虫出入																							
4	垃圾桶不用时处于一个完全封闭的状态																							
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16	能够放置较多垃圾，垃圾桶空间利用率高																							
17	不需要耗费太多电力																							

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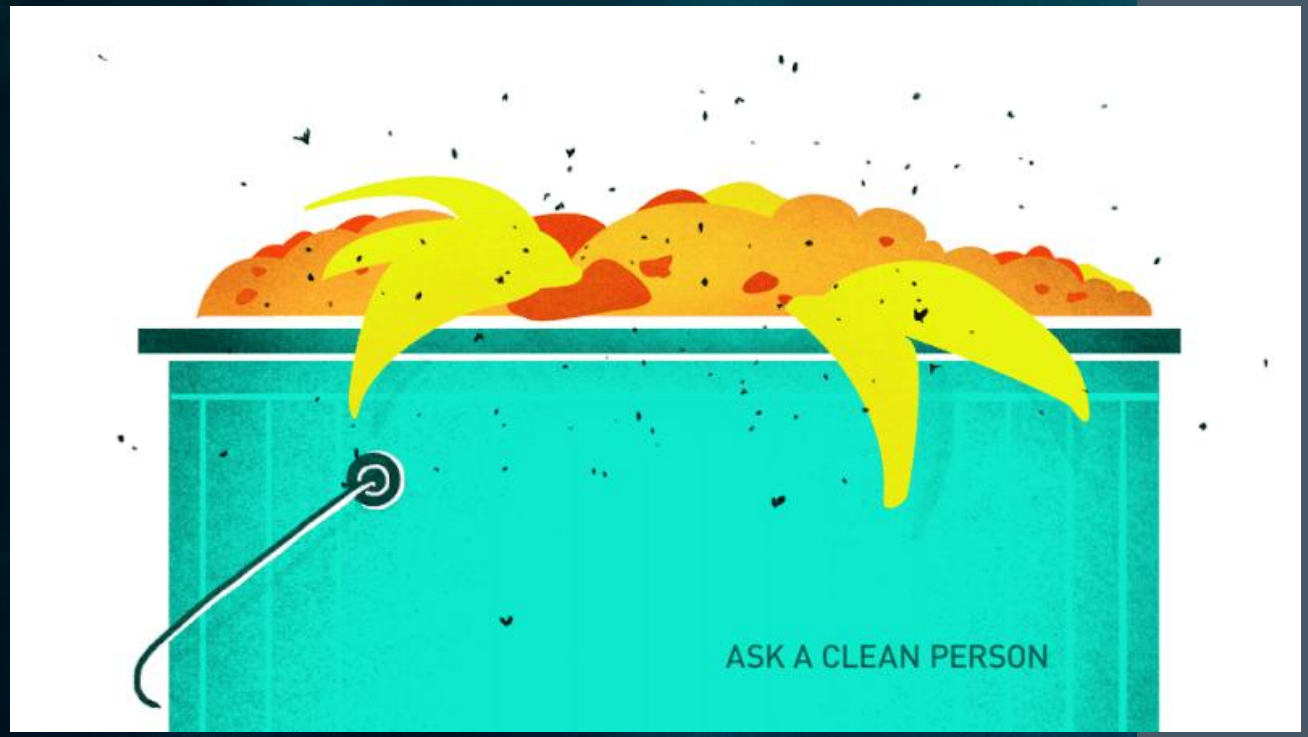
Preliminary investigation



OMG！ Pests ！ ！ ！

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Preliminary investigation

果蝇：体型较小，身长3～4mm，广泛地存在于全球温带及热带气候区，由于其主食为酵母菌，而且腐烂的水果易滋生酵母菌，因此在人类的栖息地内如：果园，菜市场，垃圾桶等内皆可见其踪迹。

特点：易饲养，繁殖快，染色体少，突变型多，个体小。

雌蝇可以一次产下400个0.5毫米大小的卵，在25℃环境下,22小时后幼虫就会破壳而出,并且立刻觅食，在25℃左右温度下十几天就繁殖一代,一只雌果蝇一代能繁殖数百只。

来源：百度

http://cleaning-ideas.com/the-most-efficient-methods-to-get-rid-of-fruit-flies/

Prototype

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不同温度对果蝇子代数量和雌雄比例的影响

将子代果蝇按雌雄比例为4:4装入9个培养瓶中每一个温度3个瓶子，并置于17℃、25℃、30℃的恒温箱中培养。

温度 / 数目 / 性别	雌果蝇 ♀	雄果蝇 ♂	总和
17℃	0	0	0
17℃提升25℃	24	20	44
25℃	63	59	122
30℃	49	45	94

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Cooling the trashcan at 10-15℃ can be a good way to kill pest at house.

- Less pest
- Cleaner
- Healthier

Preliminary investigation

®Minus Garbage Bin
(by Cem Tutuncuoglu Yanko Design)

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Preliminary investigation

	Functions			
	1. Auto-opening &closing	**2. Automatic Bag Replacement**	**3. Auto-sealing**	**4. Insect Pest Control: cooling trashcan at 10-17℃**
Concepts	1.1: Clamshell	2.1: Taiwan design	3.1: Cellophane tape	4.1: Ice-cooling
	1.2: Spirality		3.2: Chinese design	4.2: Semiconductor refrigeration
	1.3: Folding			
	1.4: Clamp			

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Preliminary investigation

Clamshell

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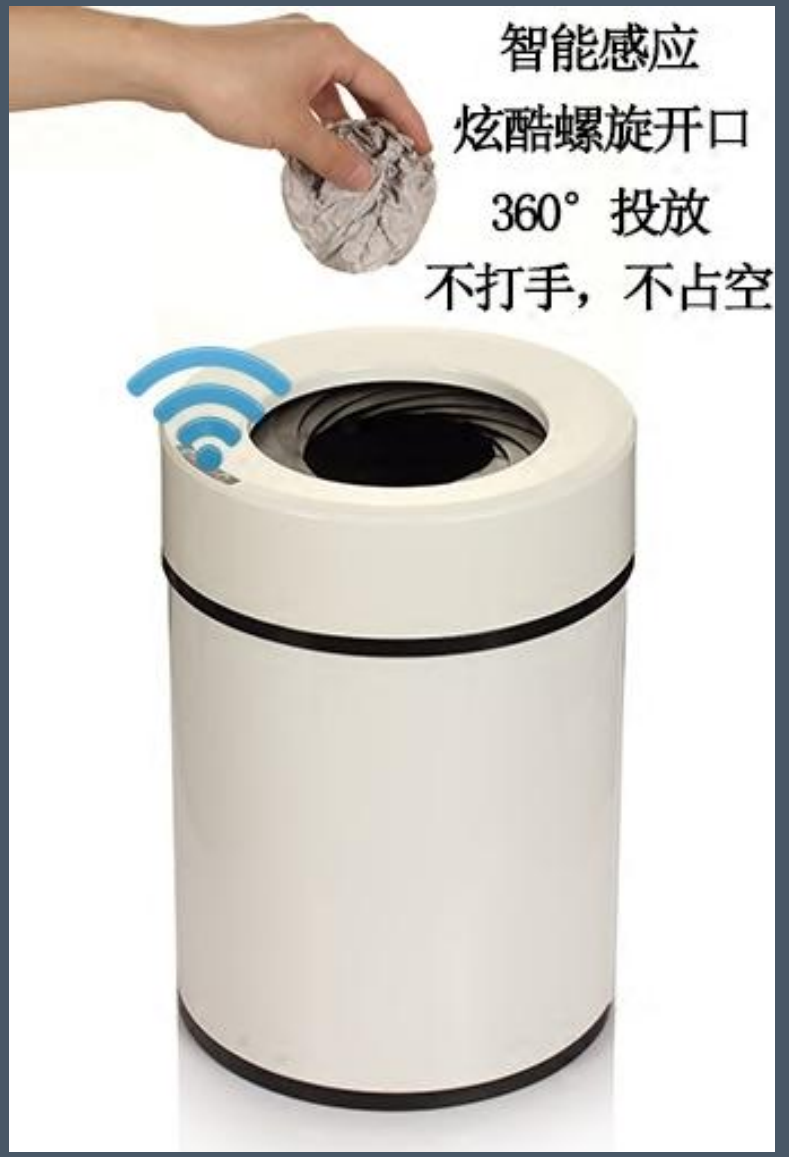
Spirality

Preliminary investigation



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Preliminary investigation

Folding

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Preliminary investigation

Clamp

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Auto-sealing

Preliminary investigation

https://world.taobao.com/item/543174576449.htm?fromSite=main&spm=a230r.1.14.16.ebb2eb2kooGo7&ns=1&abbucket=14#detail&qq-pf-to=pcqq.group家用迷你塑料袋扎口机

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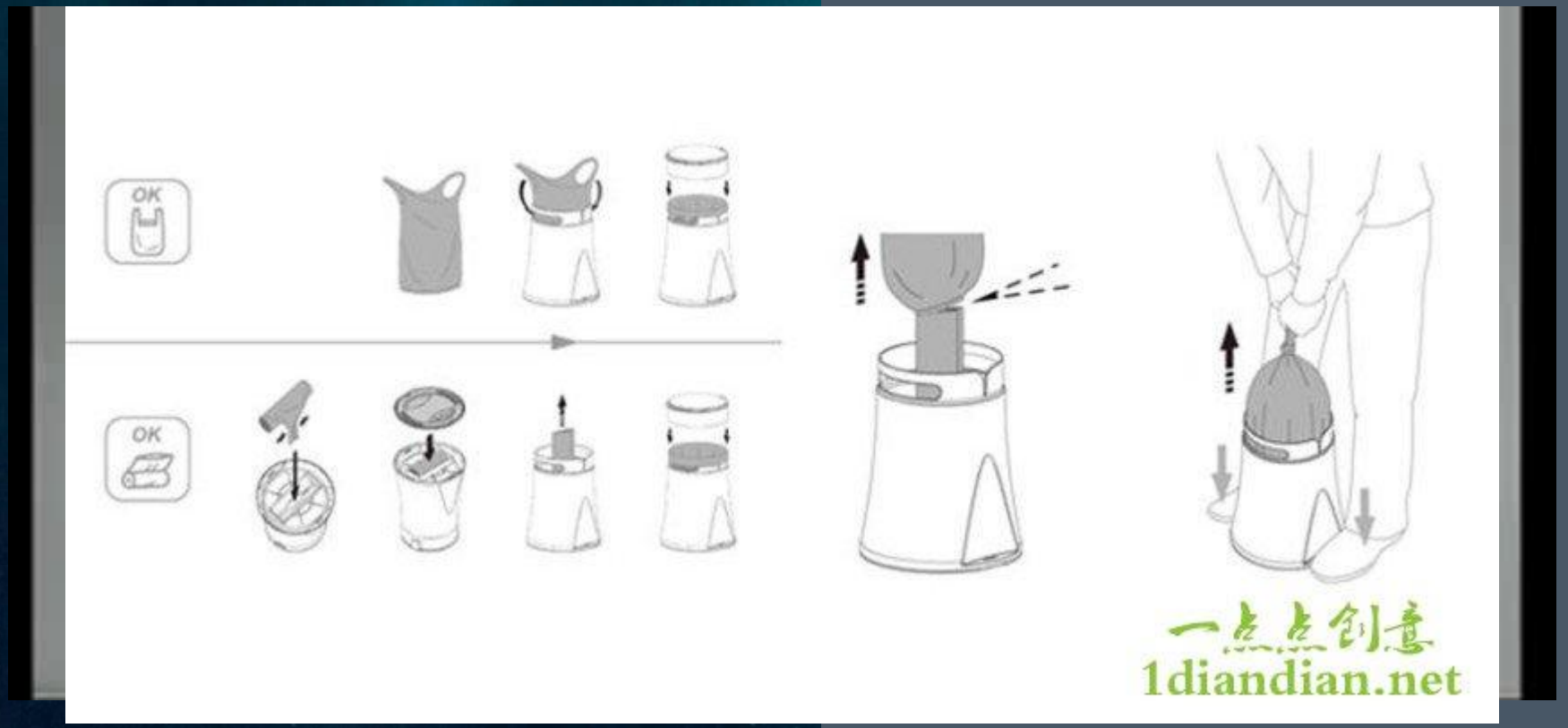
Our design for Auto-Bag Replacement is from the Red Dot Award



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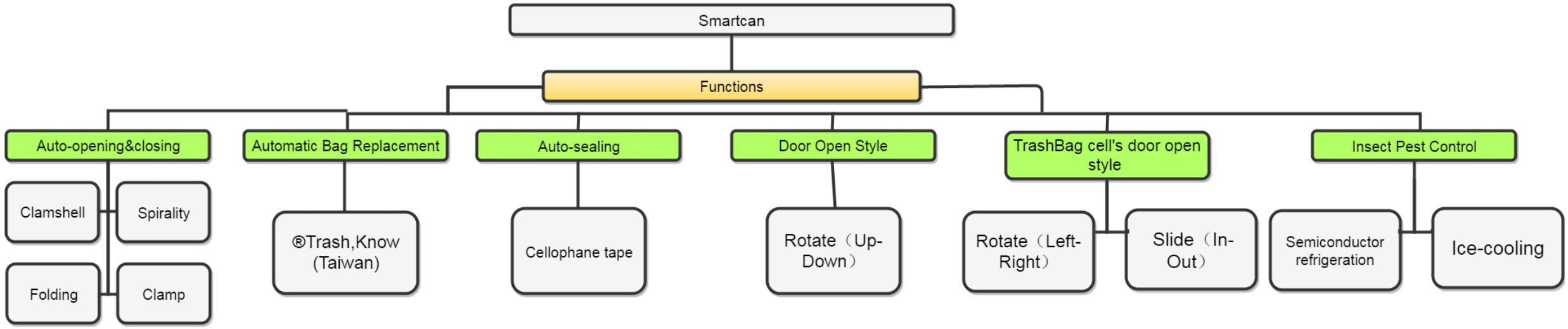
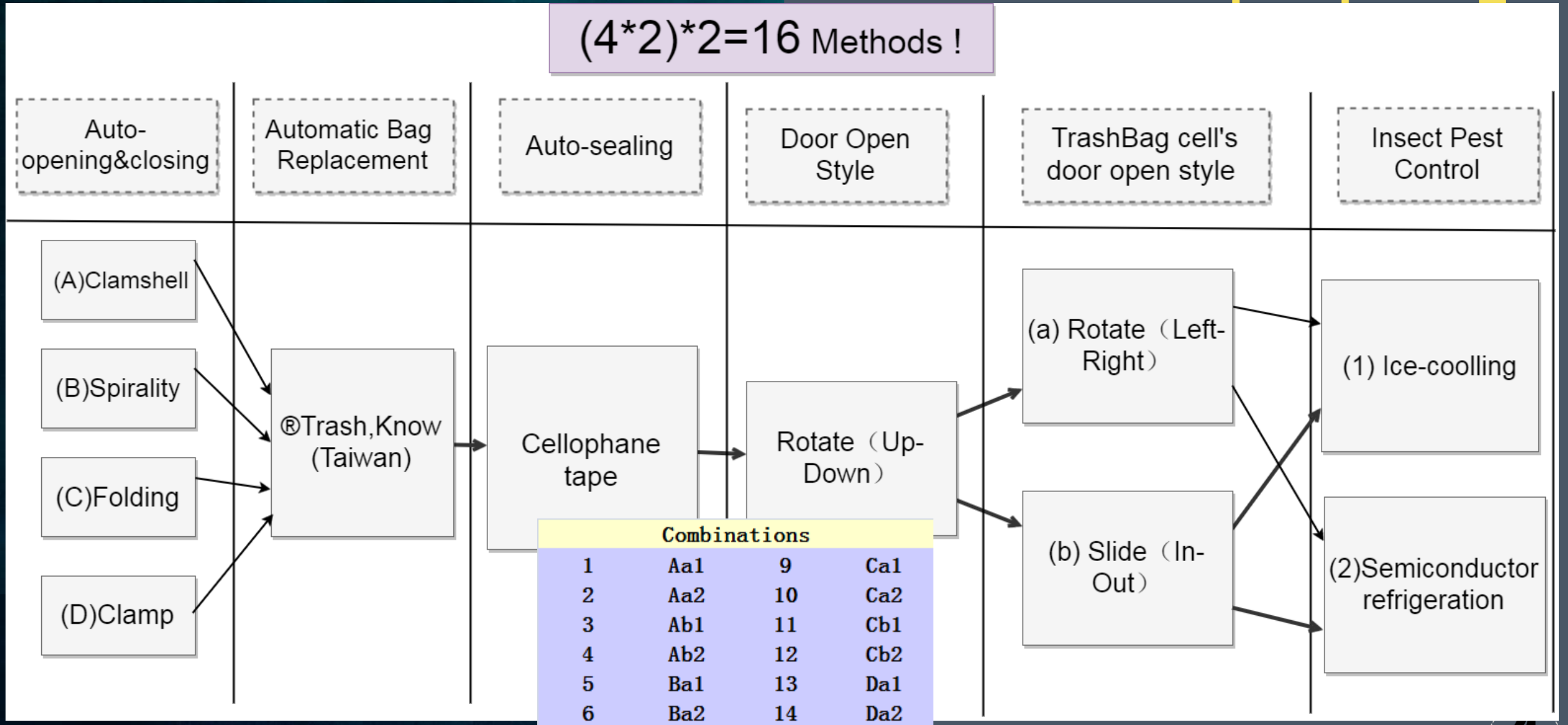


Preliminary

(4*2)*2=16 Methods !



Combinations			
1	Aa1	9	Ca1
2	Aa2	10	Ca2
3	Ab1	11	Cb1
4	Ab2	12	Cb2
5	Ba1	13	Da1
6	Ba2	14	Da2
7	Bb1	15	Db1
8	Bb2	16	Db2

Preliminary

			Concept Variants							
		Num.	1)	2)	3)	4)	5)	6)	7)	8)
Num.	Selection Criteria	REF	Aa1	Aa2	Ab1	Ab2	Ba1	Ba2	Bb1	Bb2
1	**Costs**	0	+	–	+	–	+	–	+	–
2	**Size/Capacity**	0	0	+	–	+	0	+	0	+
3	**Locks odors in**	0	0	+	0	+	0	+	0	+
4	**Cleanness**	0	–	+	–	0	–	+	–	0
5	**Safe for kids and pets**	0	0	–	0	–	0	–	0	0
6	**Manufacturing ease**	0	+	–	0	–	0	–	0	–
7	**Convenient and easy to use**	0	+	+	0	+	+	+	0	+
	Pluses		3	4	1	3	2	4	1	3
	Sames		4	0	4	1	4	0	5	2
	Minuses		1	3	2	3	1	3	1	2
	NET		2	1	-1	0	1	1	0	1
	Rank									
	Continue ?		Y	N	N	N	N	Y	N	Y

			Concept Variants							
		Num.	9)	10)	11)	12)	13)	14)	15)	16)
Num.	Selection Criteria	REF	Ca1	Ca2	Cb1	Cb2	Da1	Da2	Db1	Db2
1	**Costs**	0	+	–	+	–	+	–	+	–
2	**Size/Capacity**	0	0	+	–	+	0	+	–	+
3	**Locks odors in**	0	0	+	0	+	0	+	0	+
4	**Cleanness**	0	–	+	–	0	–	+	–	0
5	**Safe for kids and pets**	0	0	–	0	–	0	–	0	–
6	**Manufacturing ease**	0	+	–	0	–	+	–	0	–
7	**Convenient and easy to use**	0	+	+	0	+	+	+	0	+
	Pluses		3	4	1	3	3	4	1	3
	Sames		4	0	4	1	4	0	4	1
	Minuses		1	3	2	3	1	3	2	3
	NET		2	1	-1	0	2	1	-1	0
	Rank									
	Continue ?		Y	Y	N	N	Y	Y	N	N

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Preliminary investigation

	Selection Criteria	Weight	Concept Variants 1): Aa1 Rating	1): Aa1 Weighted Score	2): Ba2 Rating	2): Ba2 Weighted Score	3): Bb2 Rating	3): Bb2 Weighted Score	4): Ca1 Rating	4): Ca1 Weighted Score	5): Ca2 Rating	5): Ca2 Weighted Score	6): Da1 Rating	6): Da1 Weighted Score	7): Da2 Rating	7): Da2 Weighted Score
1	**Costs**	**15%**	8	**1.2**	6	**0.9**	5	**0.75**	7	**1.05**	5	**0.75**	7	**1.05**	5	**0.75**
2	**Cleaning**	**10%**	3	**0.3**	7	**0.7**	7	**0.7**	5	**0.5**	6	**0.6**	5	**0.5**	6	**0.6**
3	**Size/Capacity**	**10%**	5	**0.5**	7	**0.7**	7	**0.7**	5	**0.5**	6	**0.6**	5	**0.5**	6	**0.6**
4	**Locks odors in**	**10%**	5	**0.5**	7	**0.7**	8	**0.8**	5	**0.5**	6	**0.6**	5	**0.5**	6	**0.6**
5	**Safe for kids and pets**	**10%**	7	**0.7**	6	**0.6**	6	**0.6**	5	**0.5**	5	**0.5**	5	**0.5**	5	**0.5**
6	**Manufacturing ease**	**20%**	7	**1.4**	4	**0.8**	4	**0.8**	5	**1**	4	**0.8**	5	**1**	4	**0.8**
7	**Convenient and easy to use**	**25%**	6	**1.5**	8	**2**	9	**2.25**	7	**1.75**	7	**1.75**	7	**1.75**	7	**1.75**
	Total Score		**6.1**		**6.4**		**6.6**		**5.8**		**5.6**		**5.8**		**5.6**	
	Rank		**3**		**2**		**1**		**7**		**4**		**6**		**5**	
	Continue ?		Y		Y		Y		N		N		N		N	

1): Bb2: Spirality __###__Slide (In-Out)__ Semiconductor refrigeration

2): Ba2: Spirality __###__Rotate (Left-Right)__ Semiconductor refrigeration

3): Aa1: Clamshell__###__Rotate (Left-Right)__Ice-coolling

Outline

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Q&A