

# ANALY: STOOL-TESTING TOILET +

## DESIGN BACKGROUND

### HIGH FREQUENCY OF USE



Staying at home, we use the bathroom every one or two hours.<sup>[1]</sup> It is the **most frequently used place** except the bedroom. The toilet is the most important sanitation in the bathroom.

### THE DEVELOPMENT HAS HIT A PLATEAU



The toilet is a great invention. It has been more than 400 years since it first appeared in the **Elizabethan period**.<sup>[2]</sup> However, since modern times, the product has only developed in terms of comfort and environmental protection.

### UNDERESTIMATED VALUE OF STOOL TEST



Compared with other body examinations, people pay less attention to stool testing. As the samples still need to be picked up by patients, it is both inconvenient and offensive. Therefore, as **an early diagnosis of certain diseases and physical condition detection**,<sup>[3]</sup> its significance is often overlooked.

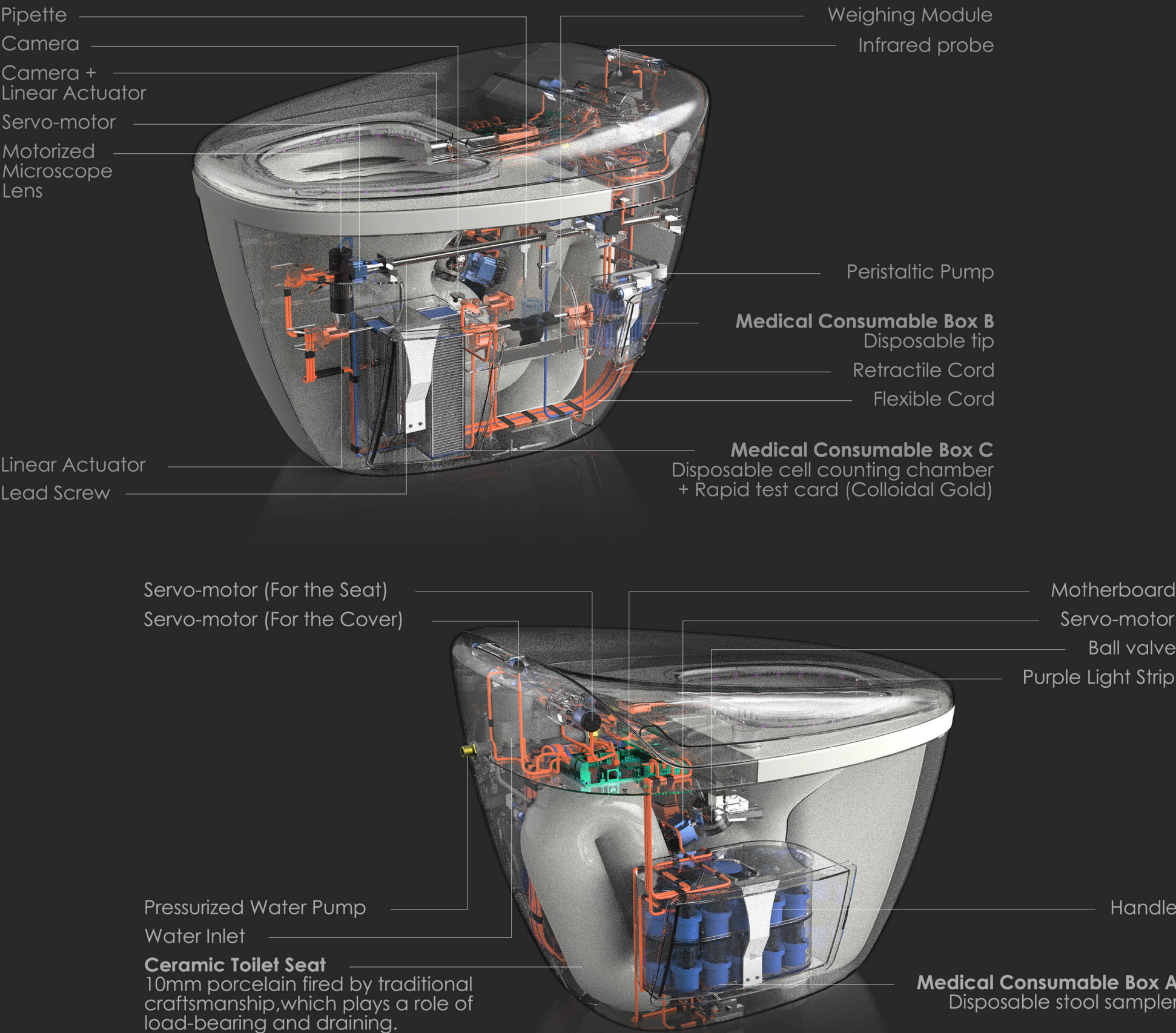
### THE VALUE OF HEALTH DATA IN BIG-DATA ERA



*Quantified self* has been put forward for many years, and product intelligence has already gone from ideal to reality. With strict privacy protection, what impact will the **collection, processing, analysis and statistics of health data** have on the urban population?

[1] <https://www.bladderandbowel.org/bladder/bladder-conditions-and-symptoms/frequency/>  
[2] [http://zone.guokr.com/area/gates\\_toilets/article/409657/](http://zone.guokr.com/area/gates_toilets/article/409657/)  
[3] <https://www.uofmhealth.org/health-library/aa80714#tp16698>

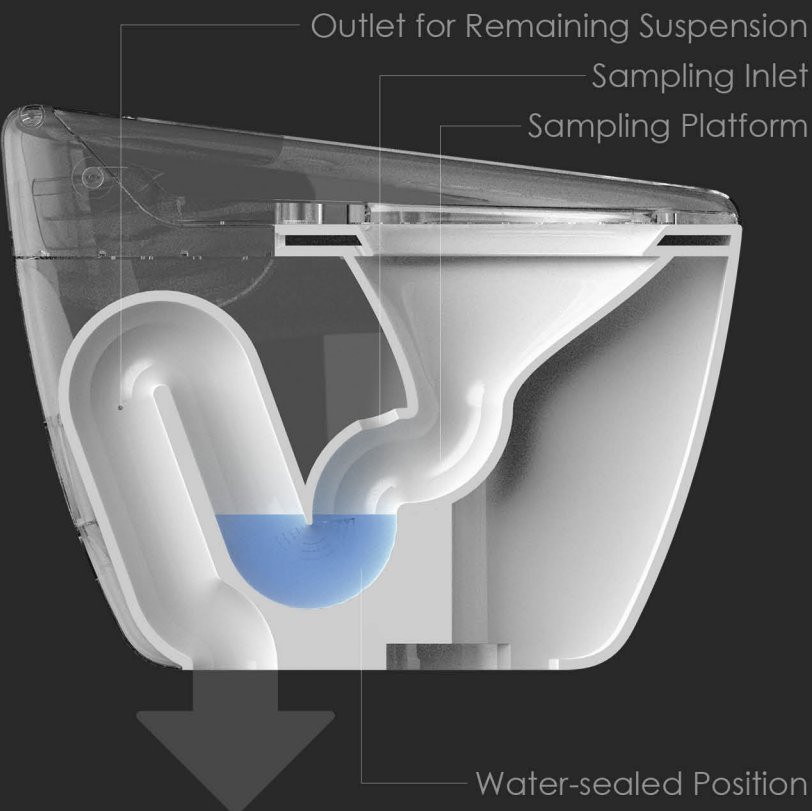
## INTERNAL STRUCTURE DISPLAY



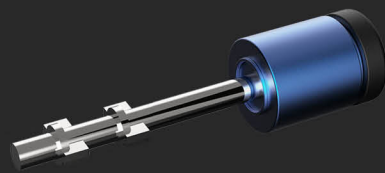
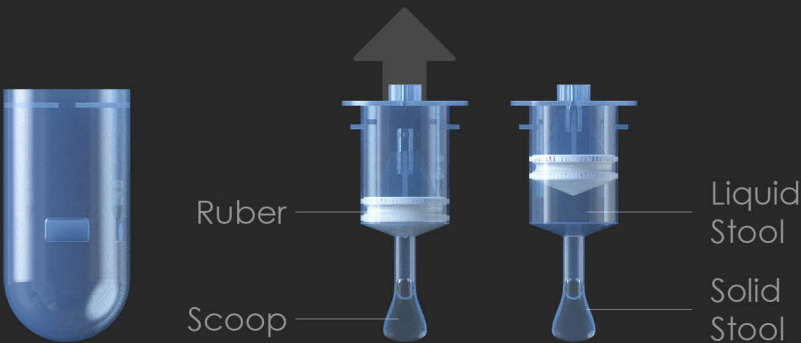


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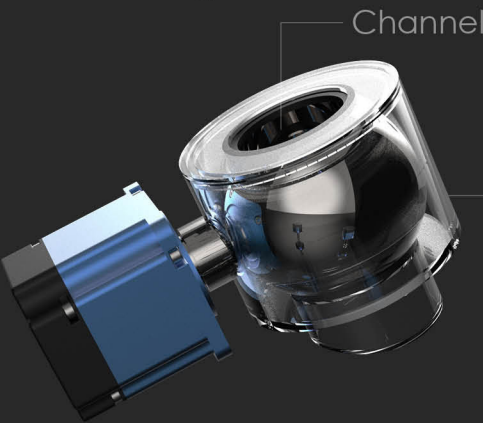
## OPERATION FLOW DESIGN



SECTIONAL VIEW (NON-MECHANICAL PART)



BALL VALVE + SERVO-MOTOR  
It can prevent water from flowing back into the mechanical part when flushing.



SAMPLER + TUBE  
This customized sampler is a combination of a syringe and a straw spoon. No matter the stool is solid or liquid, it can be sampled under the drive of a linear actuator.

User standing up is detected

Put down the cover

Pull out the camera

Take photos and upload (A)

Pull back the camera

Open the ball valve

Launch the sampler and do the sampling

Add a certain amount of water based on the calculation

Weigh the sample

Put the sampler back to tube and close the valve

Stir the sample to a suspension

Draw a small amount of suspension

Drain the remaining suspension

Drop into rapid test card

Drop into disposable cell counting chamber

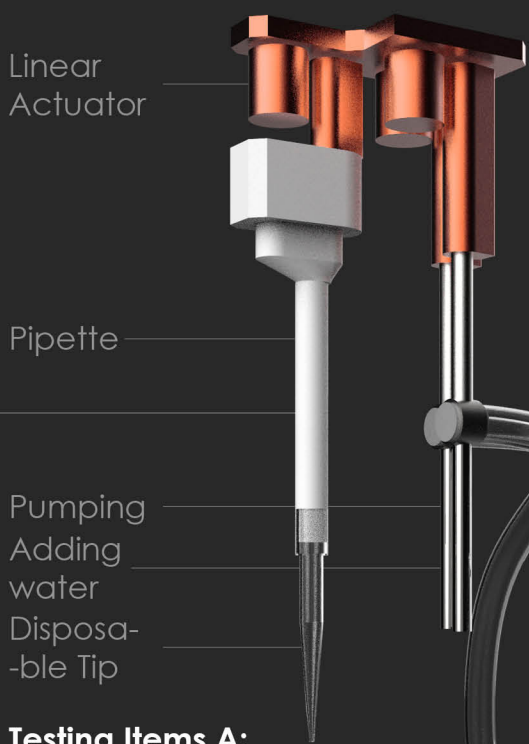
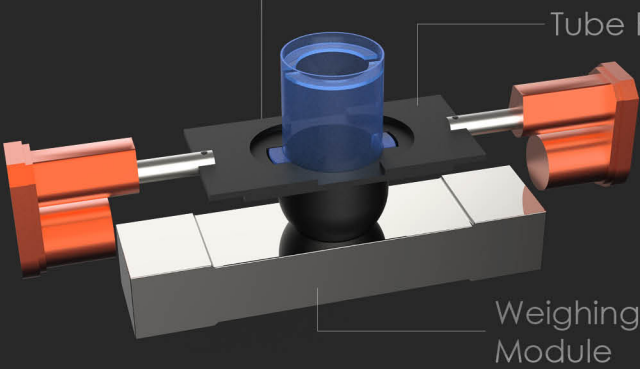
Take photos and upload them (C)

Take pictures by microscope and upload them (B)

Replace all disposable consumables

Flush the toilet

Disinfect the sampling platform

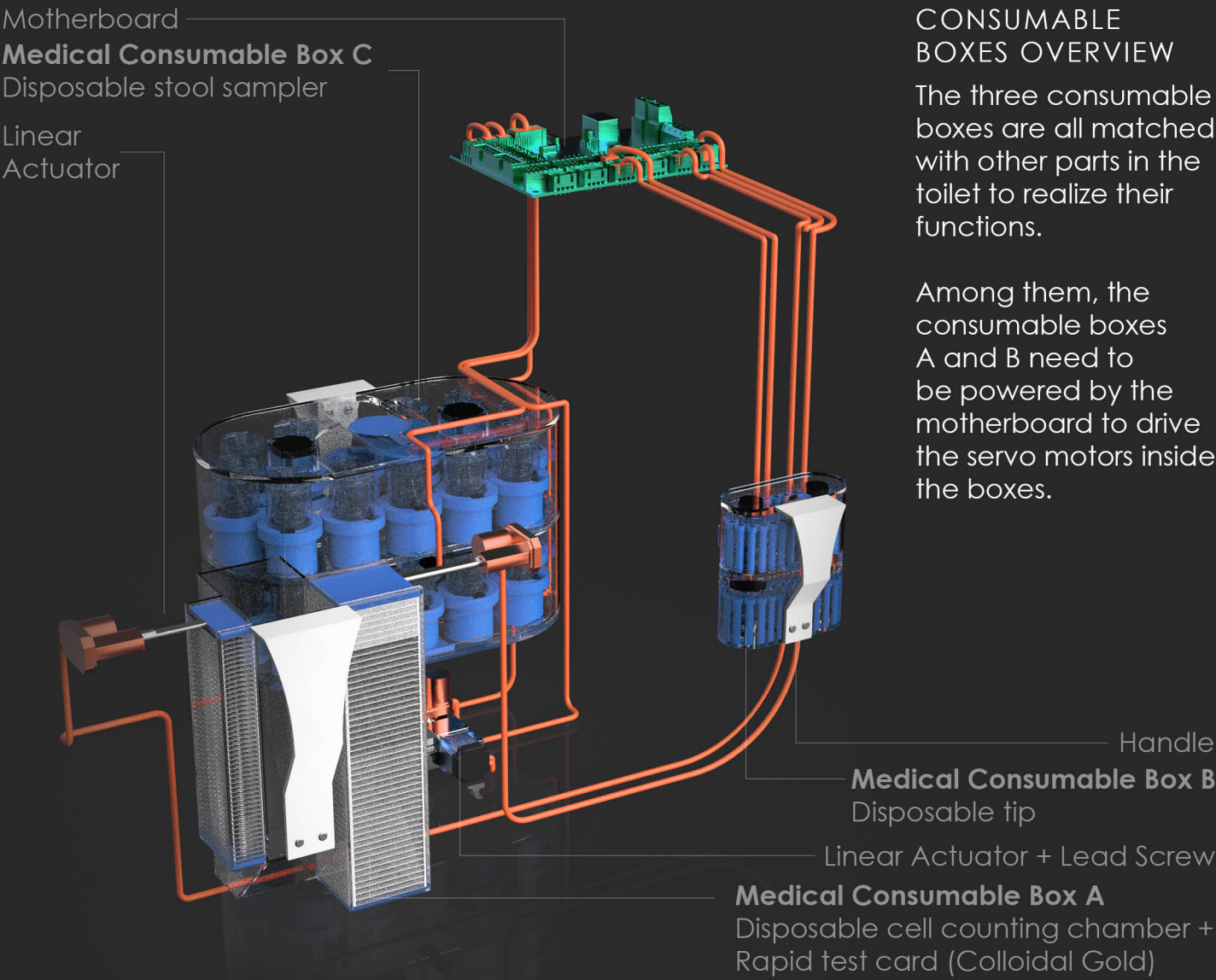


Testing Items A:  
Form, Color  
Testing Items B:  
Red blood cell, Leukocyte, Phagocyte, Fat globule  
Testing Items C:  
Fecal occult blood, Calprotectin/ Lactoferrin, Helicobacter pylori, Rotavirus, Adenovirus



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## CUSTOMIZED COMPONENTS DESIGN



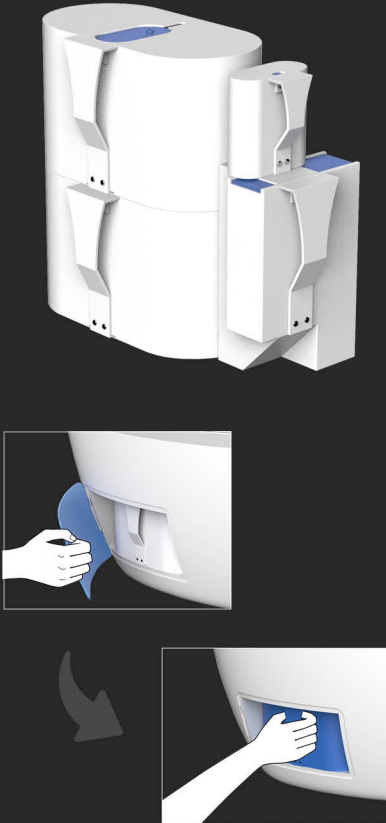
### CONSUMABLE BOXES OVERVIEW

The three consumable boxes are all matched with other parts in the toilet to realize their functions.

Among them, the consumable boxes A and B need to be powered by the motherboard to drive the servo motors inside the boxes.

### A SET OF CONSUMABLES

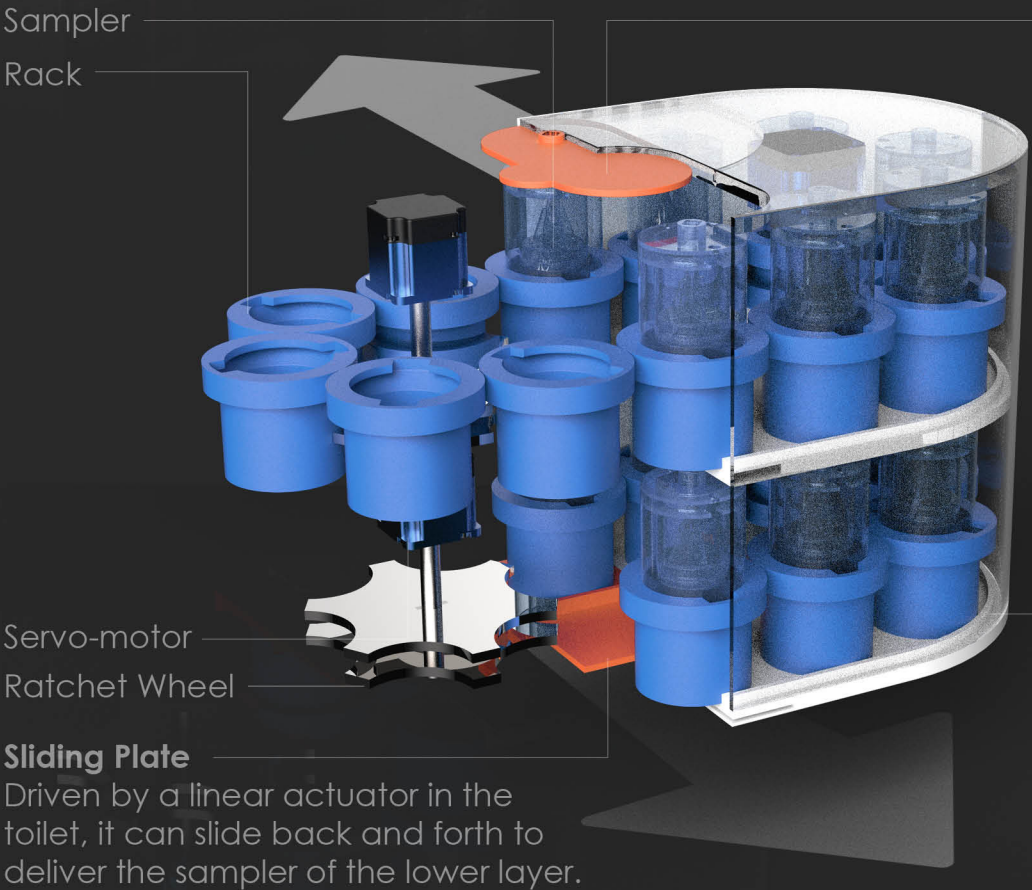
Box A \* 2 + Box B + Box C  
They can be used for 48 times, or rather 16 days by a family of three.



### MEDICAL CONSUMABLE BOX A

The consumable box A adopts a ring structure composed of ratchet wheels, guide rails and servo-motors. The simple structure realizes the function of replacing the old and new sampler positions in a small space. The design of the double-layer sharing a receiving point reduces the area of the cover and helps to block the pollution.

**VOLUME:**  
24 pieces / box



#### Lid of Box

It is difficult to open with hands, but can be opened by the facilities in the toilet, which avoids the possibility of contamination caused by internal sample outflow.

#### Guide

It has two inner and outer sides, which can strictly limit the trajectory of the racks and ensure that the samplers are always in a specific position.

### MEDICAL CONSUMABLE BOX B

It uses a structure similar to the consumable box A.

**VOLUME:**  
48 pieces / box

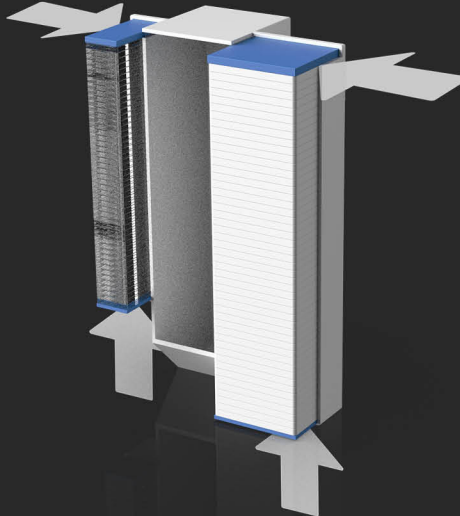


### MEDICAL CONSUMABLE BOX C

The consumable box C has three cavities for placing disposable cell counting chambers, rapid test cards (Colloidal Gold), and a storage for discarded consumables.

Two sort of consumables can be replaced with the motions of four linear actuators.

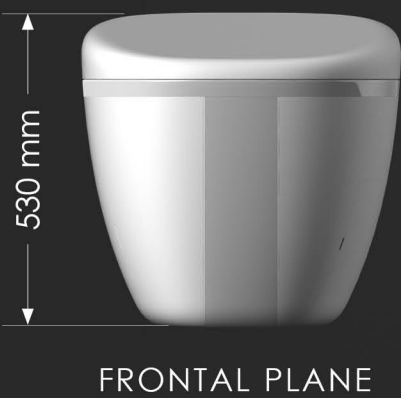
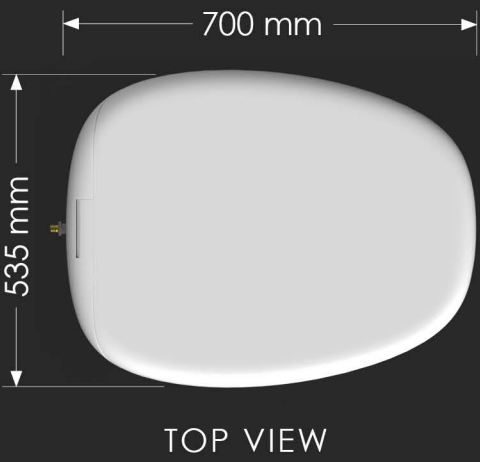
**VOLUME:** 48 sets / box



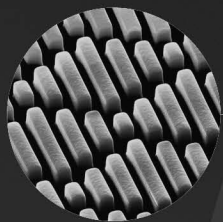


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## PRODUCT APPEARENCE



Unlike its complex function and internal structure, the appearance strives to narrow the distance between the product and the user, hoping to enable users to receive instant fecal testing services and health feedback without changing their usage habits .



SKARKLET

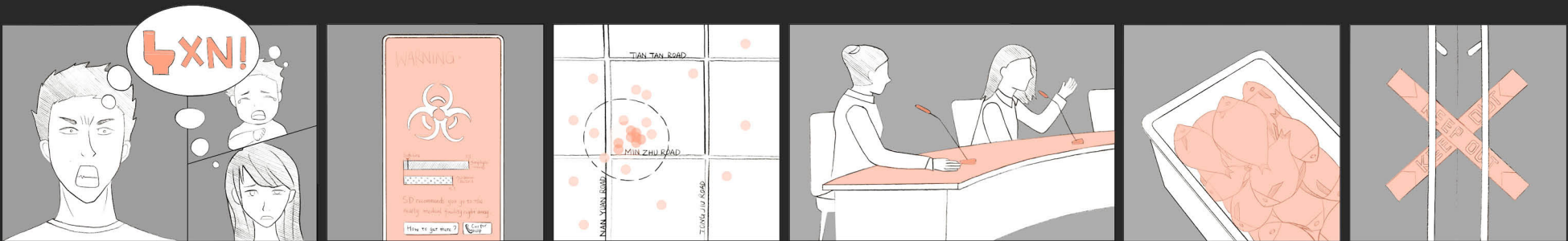
A plastic sheet material structured to impede bacterial growth.



## STORYBOARD: IN DIFFERENT CASES



**NORMAL DAYS:** Every after Mr.Lee pooped, he could receive a report on his phone. He could also purchase recommended products on the APP and view more information on the big-data platform.




**CRISIS:** One day, Mr.Lee's family had diarrhea almost at the same time, and the test results showed that there were a large number of patients with similar bacterial infections in this area, so the system immediately notified the government, which took measures to control the source of infections.





Neo Sans Std



University/R&D Teams

05/05

Toilet  
Manufacturer

Door-to-door  
Repair Service

Door-to-door  
Assembly Service

## Smart Service Application

## Big Data Analysis Platform

## Product R&D Team

## Couple (Purchaser)

## The Young

## The Elderly

Health Commission  
(Government)

Diagram illustrating a Health Consultant / Community Hospital connected to a Data source.