Aircle

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Geonho's Letter

We are all designers because we already use design principles throughout our daily lives. We would have experienced to optimize your home according to the trend of lifestyle. Also, we choose and wear clothes so as to look great as well as feel comfortable. We have been living the day in the best choice of your thinking and been planning tomorrow based on experience of problem solving. Whether we are realizing it or not, we are living in design life. We have experienced to find problems in daily life and to solve problems in our way. I want to understand people more and more to embrace their thoughts. I want to become a designer who is able to solve critical problems. My design can be inspired in our society. It is an honor to introduce this project to you throughout the beginning of my design works. Thank you.

Geonho Lee

Aircle

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Aircle offers the flexibility for personalized air filtering based on users' environments and preferences. The filters can be replaced intuitively while Aircle is mounted on the wall, which enables efficient space utilization and a clean look.

Background

The World Health Organization (WHO) announced that in 2014 alone, 7 million people died earlier than expected life due to fine dust. There are serious concern and concern about fine dust. The use of filter-attached masks has become commonplace, and the sales of household air purifiers are increasing rapidly every year. Now, air purifiers are changing from optional home appliances to essential home appliances due to the global income and living standards and well-being trends. This project was conducted for the purpose of analyzing existing products, identifying problems and improvements, and suggesting a new type of home air purifier design.

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Problem

The current air purifier filter, which combines all functions in one filter, limits the appearance and function of the air purifier. Filters that have become thicker and heavier cause discomfort in the replacement process. This type of filter was the reason for similar air purifiers in the form of thick columns.

Geonho Lee

Accelerating air pollution and changing residential spaces

A narrow residential space where it is difficult to place a sofa.
From the top right, Woongjin Coway, AP-1519B / Anam, RASO-X150

Solution

Aircle satisfies varying needs for various indoor environments by solving the structural limitations of conventional air purifiers. Aircle presents a new form factor with being a wall-mounted air purifier and providing the flexibility to customize filters to suit one's own environment.

Wall-mounted types

Wall-mounted form factor enables more effective air flow than standing types, while also achieving a clean look.

Wall-mounted structures have many advantages in almost any type of interior design. It is highly spatially utilized and creates a new atmosphere according to the shape, design, and color of the product. However, in the topic of air purifier, it was a bit of a challenging keyword. It was necessary to accurately understand the structural limitations of why existing air purifiers have no choice but to be in the form of towers. Aircle has fully designed the intake and exhaust paths within a 60mm structure while securing sufficient filter area for purification.

Aircle

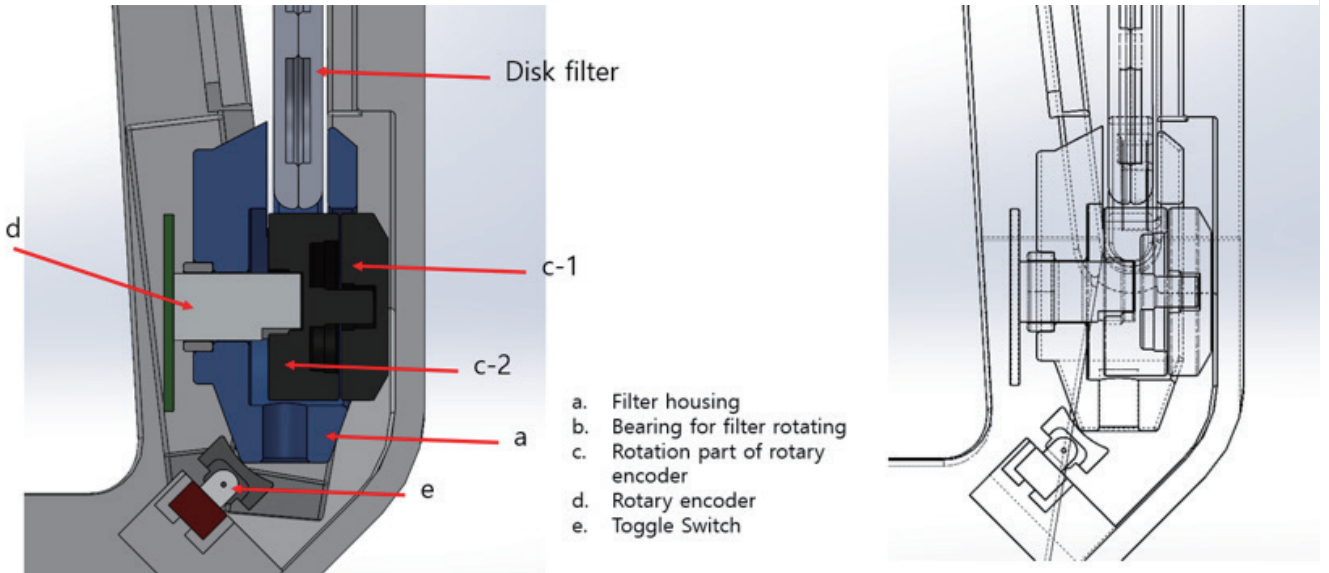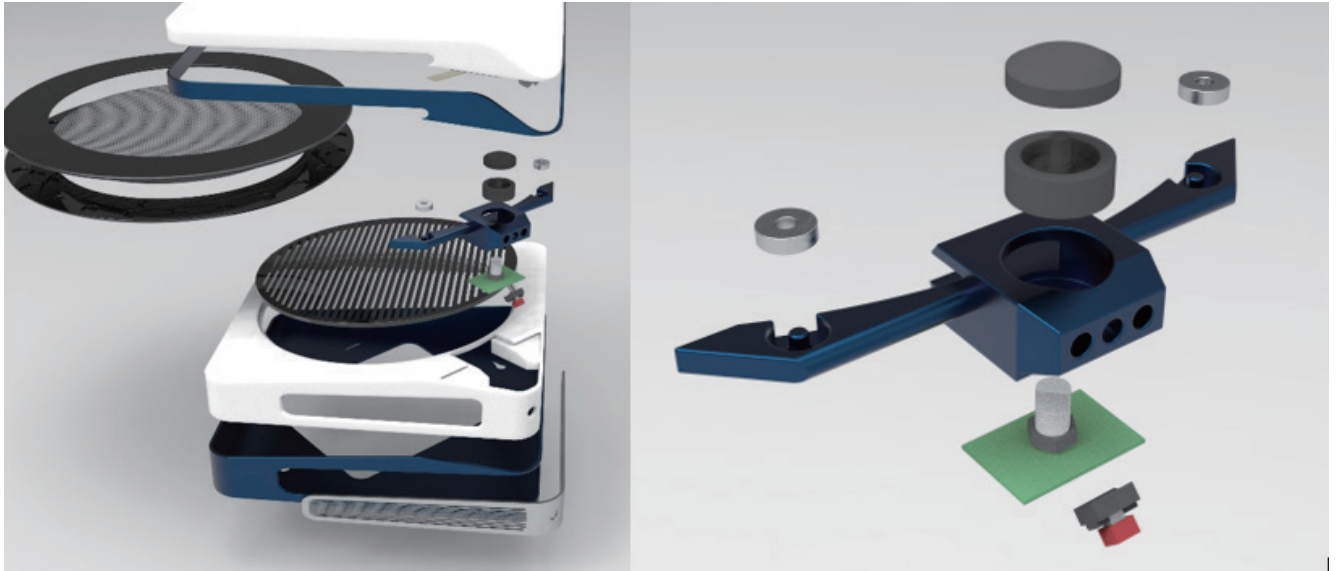*Personalized filtering for users environment*

Users can add filters by mounting an additional filter specialized for removing specific pollutants.

Different situations and timings require different filters. For example, in a home with children, user can choose a filter that focuses on air pollutants that are not fatal to adults but can be fatal to children. In addition, in a house with a companion animal, user can take a filter that focuses on purifying allergens caused by companion animals. Moreover, it provides effective and immediate solutions to problems that cause temporary air pollution, such as sick house syndrome and surrounding construction work.

Geonho Lee

Replacing the Disk Filter provides a differentiated user experience from conventional air purifiers. The process of replacing the air purifier filter, which was not enjoyable in the past, has been solved with a new type of disk filter with LP as a metaphor. Two existing problems were solved by using a simple replacement method like replacing LP.

First, I improved the replacement process by making the heavy and thick air purifier filter lighter and smaller. With a structure that can fundamentally reduce the separation of dust generated during the replacement process, the user's uncomfortable experience is minimized. In addition, the structural limitations of the existing air purifier filter have been solved through the disk filter. Severe contamination of one or two filters in multiple layers can solve a significant decline in overall functionality. It induces cost savings in the long term because only each filter needs to be replaced according to the proper cycle and the degree of contamination.

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Solution

UNIST DESIGN

Disk filter

c-1

c-2

a. Filter housing
b. Bearing for filter rotating
c. Rotation part of rotary encoder
d. Rotary encoder
e. Toggle Switch

d

a

e

Exploded view and detail structure

It was manufactured based on Arduino control by providing power through 12V-220V. A 12V blower fan was used to devise an air flow path suitable for a thin wall-mounted structure. In terms of operation, two large sensors were used.

The most important point and the biggest advantage of the project 'Aircle' is that it has implemented all functions. I have created a working prototype that does not just make the appearance and finishes it, but also allows all the proposed functions to work.

Using a 3D printer, the external and internal components were made out of PLA, and the quality of the result was improved through post-processing. The functions of the product are implemented using various sensors and parts based on Arduino. It seems that production was relatively easy because there were enough concerns about the structure and shape of the product before designing the specific shape.
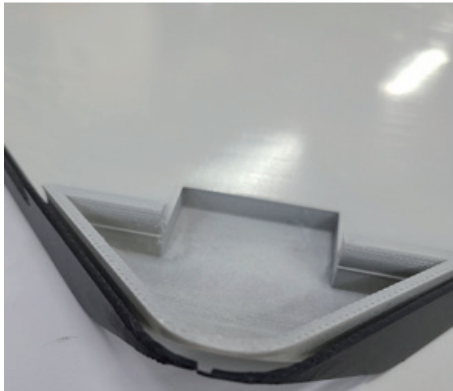
Outcome

First, choose a filter. The gas and fine dust sensor built into the body measures the air environment in your home for up to a week and can recommend the most suitable filter combination.

After selecting a filter, the fan starts to operate when the filter is mounted on the main body. If you want to stop working for a while, put the filter forward
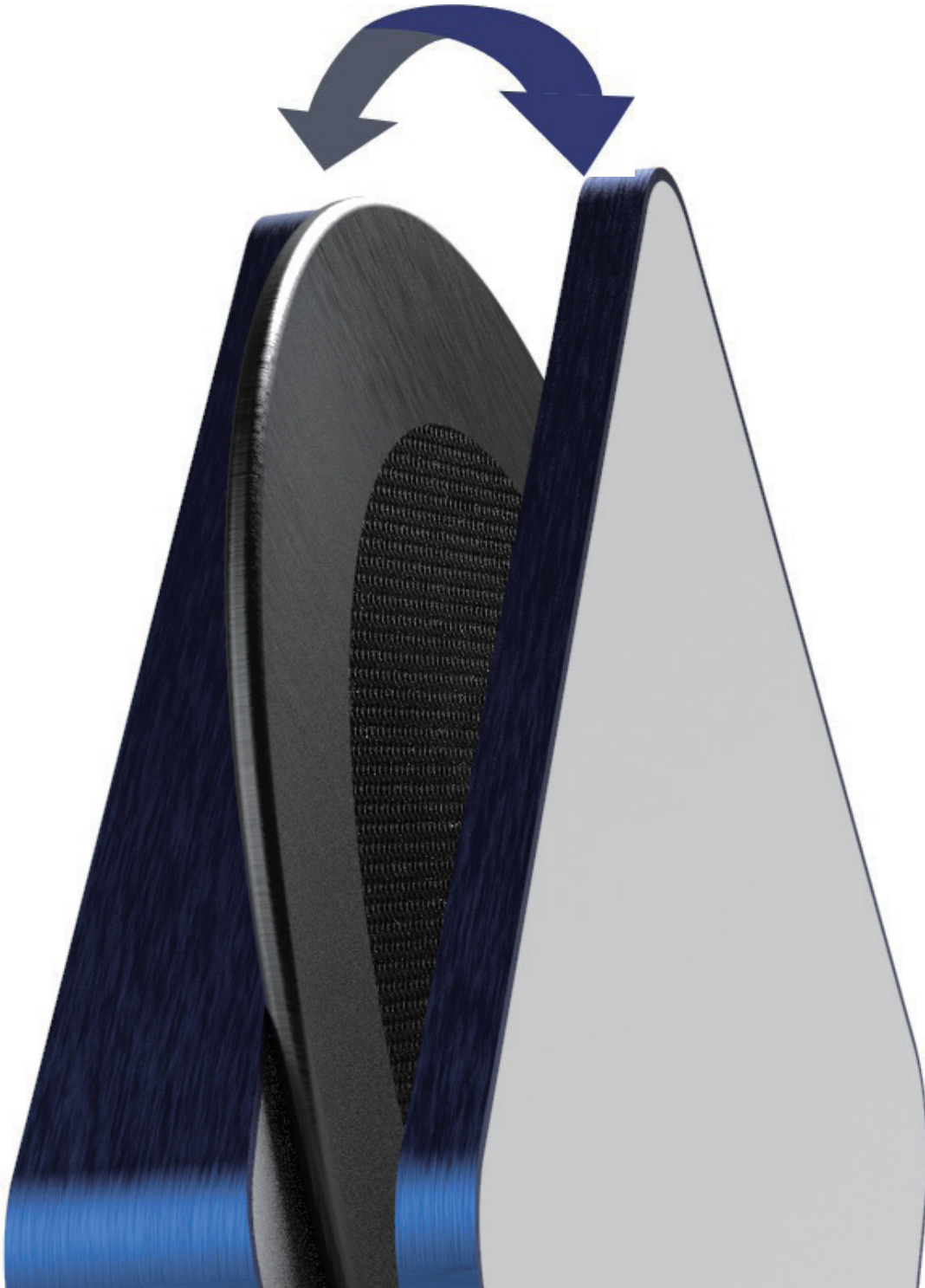
When you want to control the fan speed or change the operation mode, hold the disk filter with your hand and rotate it lightly.

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Select the filters for your environment →

You can create an air cleaning filter combination that is optimized for each home environment.
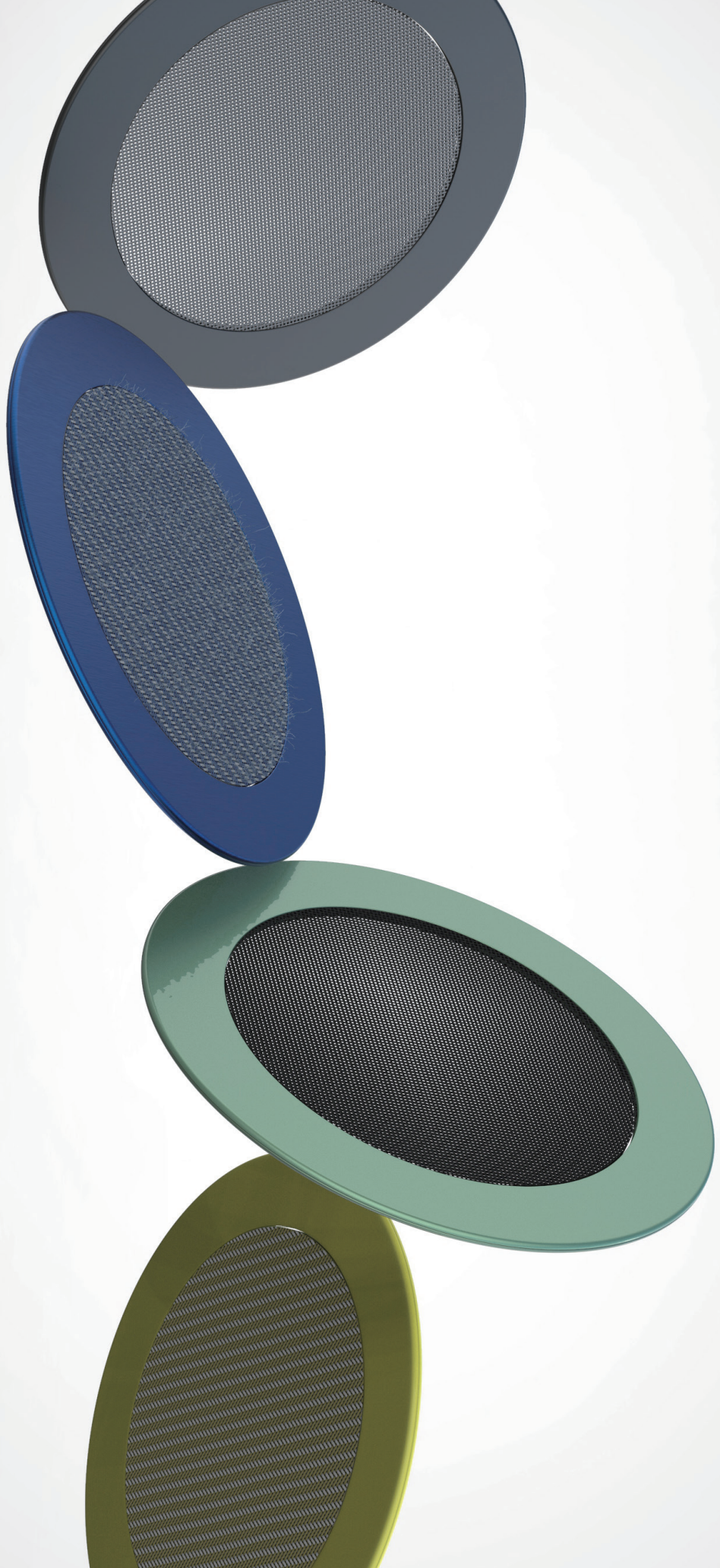
Power on/off User scenario

After passing through the filter, it starts working when it is completely handed over.

Control fan speed

User can control fan speed and operation mode by rotating the disk filter. A rotary encoder is used to read the rotation value of the disk filter.

Offline Exbihition

In the offline exhibition, we thought about how to better show the product's operation and features. The wind was shown by the scattering of thin grasses, and the characteristics of the disk filter were expressed through packages and demonstrations.

Build your fresh air

Epilogue

"Design is thinking made visual"

Question to yourself??

There is a quote that I have in my mind. Inspiration is for amateurs. The rest of us just show up and work. I think working everyday is the only way to get more ideas.

How could you work on your graduation exhibition for a long time?

Graduation exhibition during one-year was very long time. Since this is a long-term project I've tried for the first time, I had a lot of difficulties with time management and sudden problems. However, I was able to complete it step by step with the help of many people around me. If I was running just looking ahead, I had been tired. It seems to be important not to miss the people with me and the beautiful scenery around me while working.

How did you work on the mock-up?

The most important point and the biggest advantage of the project 'Aircle' is that it has implemented all functions. I have created a working prototype that does not just make the appearance and finishes it, but also allows all the proposed functions to work.

Using a 3D printer, the external and internal components were made out of PLA, and the quality of the result was improved through post-processing. The functions of the product are implemented using various sensors and parts based on Arduino.

It seems that production was relatively easy because there were enough concerns about the structure and shape of the product before designing the specific shape. In your project, I recommend that you consider from the design process to completion and assembly. We're still amateurs, so we'll end up running into problems, but we'll be able to do better.

Do you have any know-how to deal with feedbacks from professors?

I think that we should be a more active student. As a project leader, it is important to have a clear blueprint and design direction. Professor's feedback is certainly the fastest and most effective way to get help on areas we miss and lack, but we run into the limits of time and resources to accommodate all feedback. It will be important to clearly categorize what you can and cannot do, and actively choose and focus on reflecting their feedback as much as possible.

Geonho Lee

"My heart beats when I solve problems.
  If value is added in the process, it is perfect."

Do you have any special episodes?
I remember various episodes. There was some feedback on how to effectively show the wind coming out, that it would be a good idea to put cattails or wind-blown plants under the air hole. To reflect this, I went to a flower shop to buy flowers, and ordered cattails or reeds that fly better. However, I can't get it, so I went to the Taehwa River to pick up cattails, willows, reeds, etc.
The second is the moment when all functions are implemented. As I rotated the disk filter and added a forward and backward motion, I had a lot of difficulties in implementing it. When I didn't have enough friction, I felt like I had failed the project. After various attempts, I finally solved the problem and implemented all the functions.

What is your future plan?
First of all, I would like to achieve various achievements by utilizing the results of this graduation exhibition. I would like to quickly finalize the patent registration and design application that started from last month, refine and improve the results, and submit them to various competitions. I want to introduce my ideas to more people and

receive sympathy.
It was a period when I could think a lot about what I want to do and what I can do well in the field of design. I want to become a designer who can understand and execute the overall design process while creating prototyping that not only looks but also functions.

Last words?
I think that the great pleasure for designers is getting people's empathy. I want to constantly think about meaningful and valuable designs and create designs that can inspire someone.
Thanks to all the people who gave me a lot of support and help during this graduation exhibition.

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Graph, Number of sales air purifiers in Korea market / Online shopping mall DANAWA

Figure, typical indoor pollutant according to the place/ T-story natural protector, https://ecofresh.tistory.com/3

Geonho Lee

* All other visual contents were created by Geonho Lee, the author of this issue.