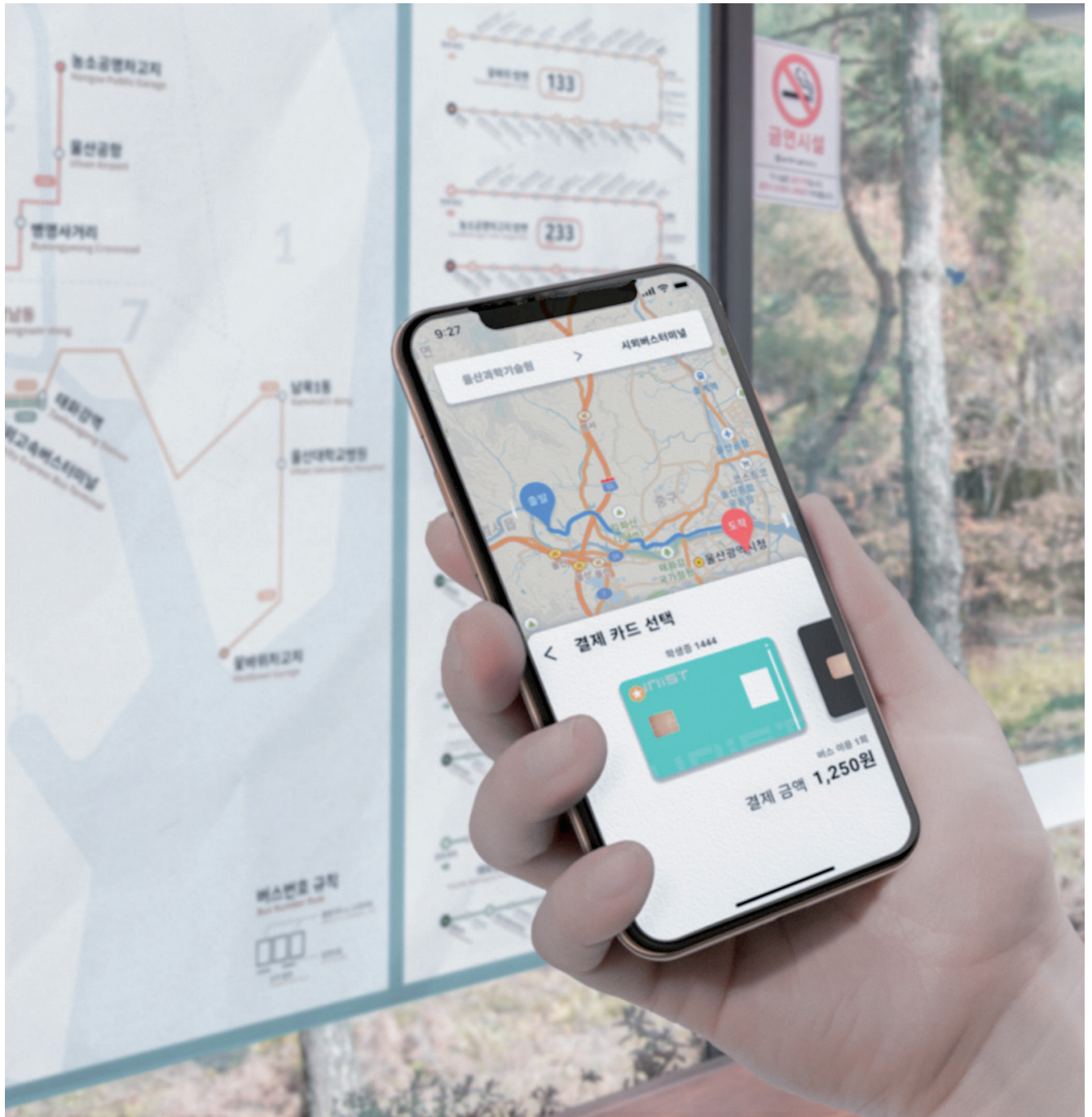


BaaS : Bus as a Service



Seongbeom's Letter

What type of transportation do you usually use to go to work or to meet your friends? I was born and raised in Jeju-do, and it has been five years since I came to Ulsan for my studies. So, if I move somewhere, I always only take the bus for whole my life.

Also, becoming a smartphone-era, the world is gradually becoming smarter. However, the bus stop and its information system remain the same for decades.

If so, I was thinking about how to close this information gap and improve the bus experience. Starting with this project, I'm going to research the bus experience, so please keep an eye on my project.

Thank you!



BaaS

**; Bus route map
and prepayment system
for an improved experience of bus**

Seongbeom Kim

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**What factors can enhance the
bus experience in most cities
without metro in smartphone-
era?**

Seongbeom Kim

Background

In Ulsan, there is only public transportation, that is the bus. But, people are suffered from the bus system of Ulsan. According to Ulsan-Ilbo, public transportation satisfaction in Ulsan is worst than in other metropolitan cities in 2019. There are problems in Bus-Bus stop-Passenger relations connected organically[1].

In details, passengers complain about safe driving, drivers' kindness, the arrangement of the bus routes, and passing through non-stop. It seems that bus drivers' training solves the two in the front, but others are caused by a lack of interaction with bus drivers and passengers.

Also, there is a lack of information at the bus stop for passengers to notice the bus route. There were just some names of bus-stop, not all things. Some don't have any departing time as well. Also, the difference between promising passengers' real destination and where the bus stops is huge. For example, when we go to CGV in Samson-dong, we have to take #733 bus and arrive at the bus- stop, 'Intercity Bus Terminal.'

It's not a big deal with those who already use it several times, but how about a stranger in Ulsan? They have to search in the map app from their smartphone. Or ask questions to all bus drivers whether this bus goes to CGV nearby or not. It means that it's hard to take the bus with information about the bus-stop. In the elders' case, those who don't use smartphones cannot go to other places where they've not ever visited.

Therefore, in the smartphone-era, bus-stop has to get the meaning beyond the terms 'bus' and 'stop' in design aspects.



A bus-stop in Ulsan

Concept

Urban-rural complexes like Ulsan have a low population density and no unique means of transportation other than buses, so their dependence is relatively high. Since people have to travel through a large territory, the bus's driving time is long, and its interval time is also long. Furthermore, it has been ten years since smartphones have been wide-spread, but the bus stop's information systems remain the same. That is why the information gap between those who are familiar with smartphones and those who are weak in smartphones is widening. And this system inevitably increased the discomfort of users and resulted in less use.

For these reasons, I designed the analog bus route table to be useful to the smartphone-handicapped by making it more accessible to information. Besides, inspired by the case of Wayfinding concept by Design Studio Muotohiomo in [2], I wanted to design more than just a route table, and also a digital service and system by making for people who familiar with digital feel better usability than ever before.



Wayfinding concept by Muotohiomo City of Turku

A design project which resulted in a new wayfinding concept for the city of Turku. The wayfinding concept endorses safety, makes the city more approachable and encourages active travel by foot.

Design Development

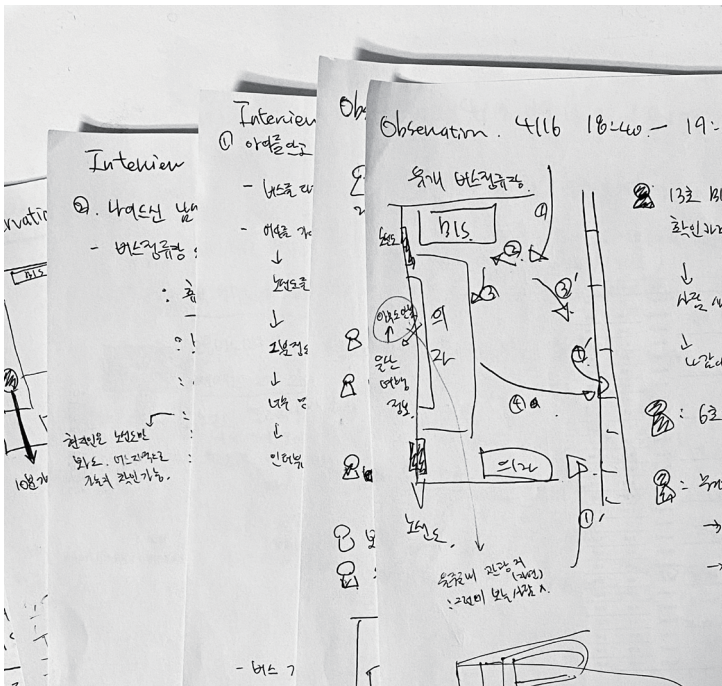
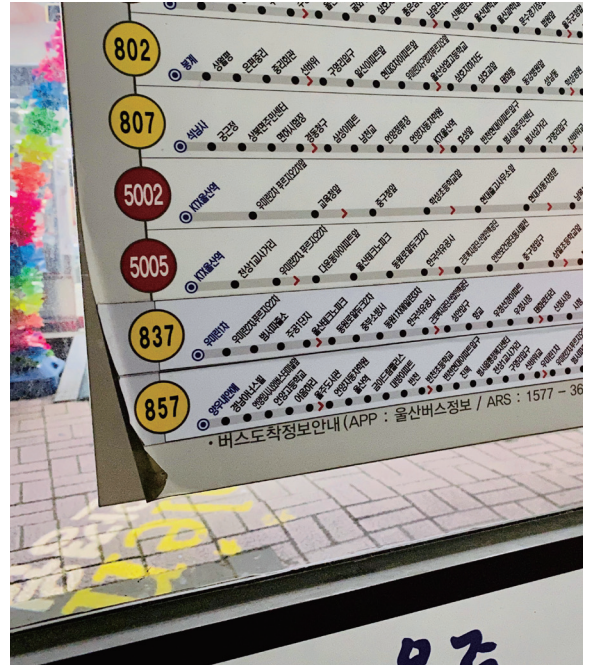
User Research

I conducted field observations and interviews based on desk research.

The field observations were conducted at 'Umirin 2nd' bus stop, a relatively much floating population even in Ulju-gun, a city suburb. From April 16th to 22nd, I sat at the bus stop from 11 am to 12 pm and from 7 pm to 8 pm for a week to observe people's behavior.

Interviews were conducted by meeting passengers, bus drivers, and local governments to hear all their positions. I met Eight people waiting for the bus of all ages, from teens to 60s. Also, I met a bus driver who drives #133, one of Ulsan's longest bus routes, and two officers at Ulsan City Hall to talk with the bus route and the Ulsan bus app.

After all the research was over, I reorganized the description using notes, photos, and records to reference when the memory was vivid.

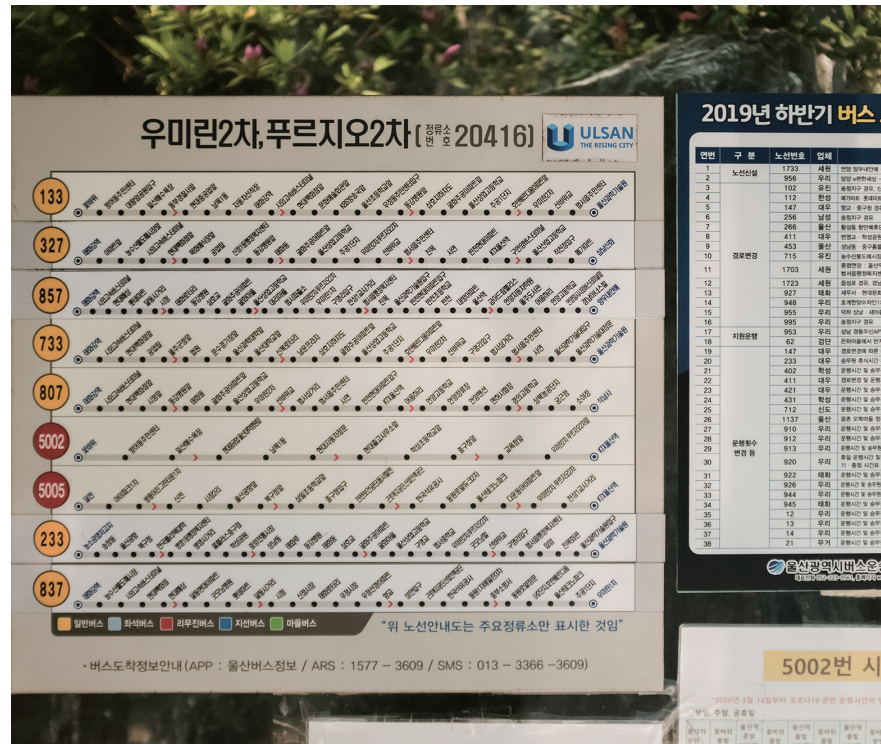


↖ ↗ *Field observation place*

The field observations were conducted in 'Umirin 2cha' bus stop, which code number is 20415. Total 13 buses pass through this bus stop.

← *Think description*

Before I did interviews, I got permissions of taking photos and recordings. I retook notes based on the materials like live-notes, photos, and records while I conducted the field observations and interviews before my memories went away.



↑ The first and last digits in the bus number in Ulsan represent either the departure or arrival area. However, this simple principle is not often understood by users because the bus numbers are listed in an ascending order only by the first digit on the table.



← There is a disconnect in the communication between passengers and bus drivers. Some passengers stand by the edge of the sidewalk to be seen by a bus driver, which can be dangerous, while others do not notice the bus has arrived as they are using their smartphone or having a conversation. Some bus drivers skip a bus stop of the passengers do not express their willingness to take the bus, while others sound their horns to inform them of the arrival.



↑ As a result, passengers need to constantly cross check the route map for direction and the bus information system to see when a bus arrives at the stop. Passengers can talk to strangers or bus drivers when they are about to take a bus to get to a place you've never been to, but they cannot always expect kind and correct answers.



The break time of a bus driver can be shortened, if s/he does not meet her/his set schedule, and the specific bus may be cancelled if the bus arrives to the garage after the next departure time. As a result, they have no choice but to drive the bus in a hurry.

According to the Ulsan Traffic Management Center website, I could know each bus route with a thick red line and bus status about whole buses in Ulsan[3]. Then I traced ten buses through the Umirin-2cha bus-stop. However, there are many overlapped routes, so I have to make some rules for distinguishing the bus routes.

I was mapping the bus routes on the Ulsan map, which got the inspiration for the metro map. However, there are many bus routes overlapped, and it has quite different from the metro case. So, I put the lists of Top 10 bus-stops for indicating the bus direction.

However, compared to the map's size, the route part was tiny, and the overlapping of the route is so severe that it was difficult to mark it with the thickness of the line. Also, as I put only the top 10 bus stops next to it, it seemed that important information on the existing route map was omitted, so I decided to change it from the beginning.



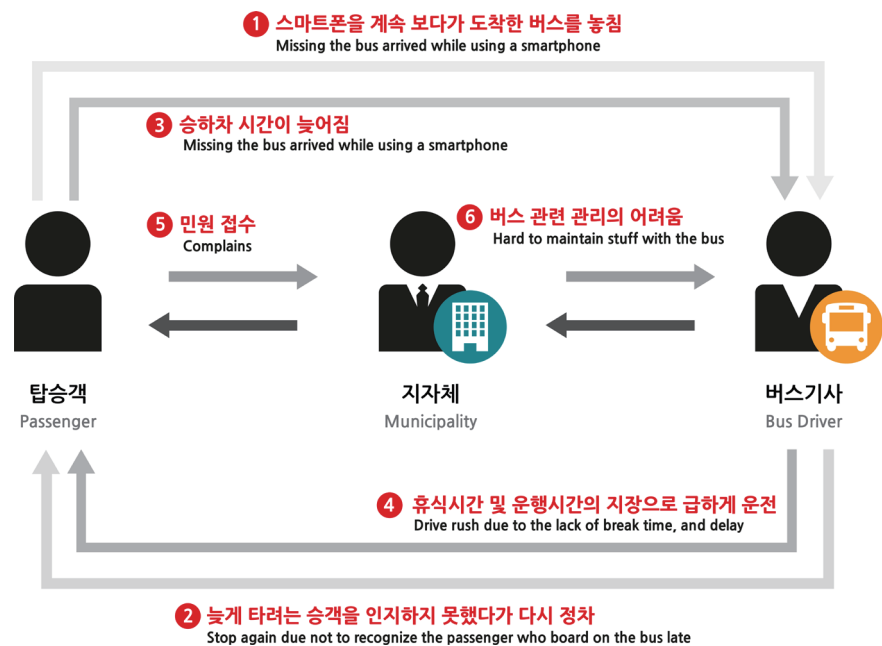
Initial Ulsan bus route map

Ten routes passing through the Umirin-2cha bus-stop, and I make the map focused on the current location and arranged the buses by last digits, not first digits.

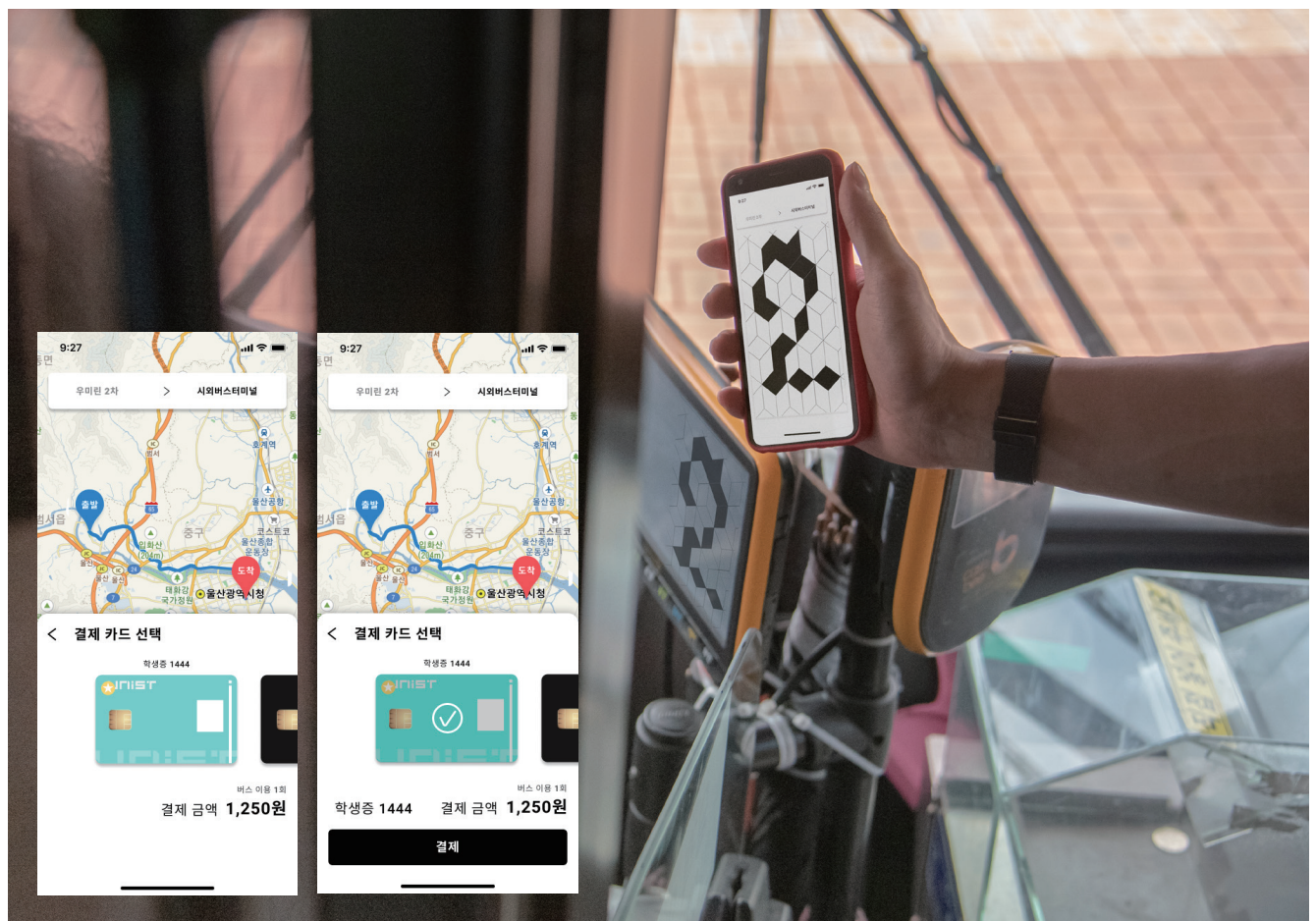
As shown in the figure below, everyone has their own problems while running the bus. So, communication between users is essential.

To give the credibility of the information that there are passengers trying to get on the bus, the act of purchasing a ticket was chosen. And by making a purchase, passengers can be assured that they will not miss the bus they are trying to board.

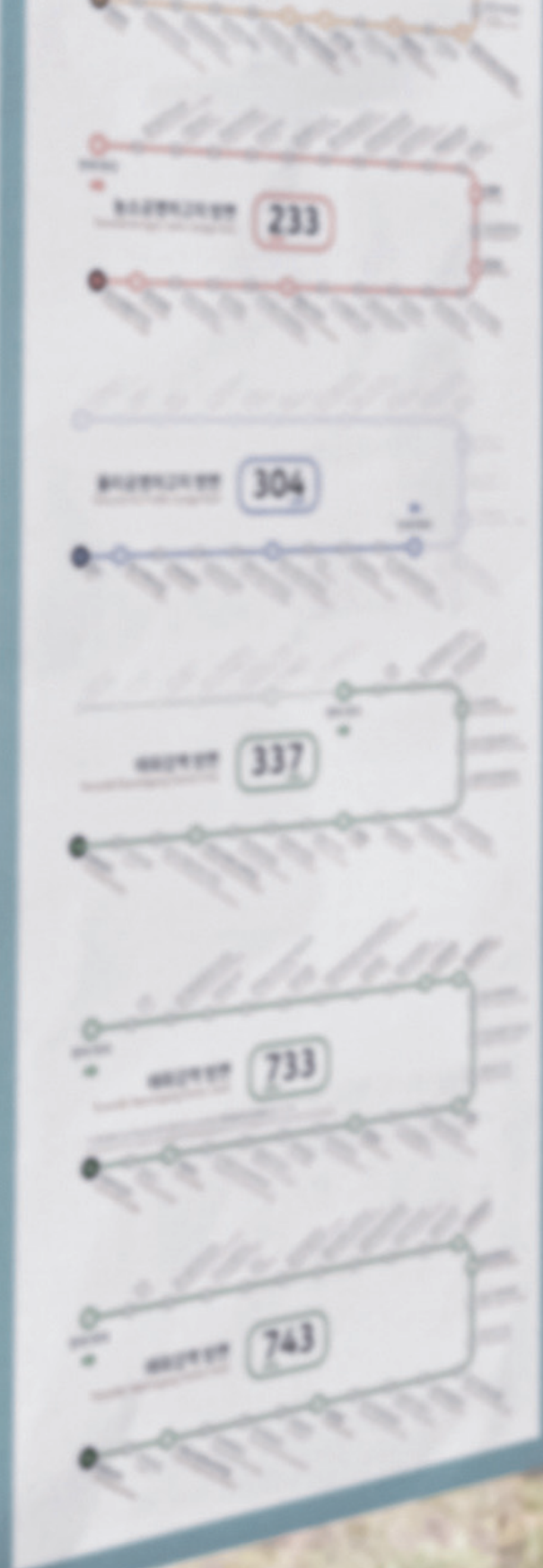
It has limitation conditions: 'In some distances of bus-stop where passengers take the bus,' and 'Before the bus departing from the prior bus-stop.'



The bus app's prepayment process is from clicking the path option, selecting the card, paying a bus fee to the number-like pattern pop-up. And It makes the bus driver compare the pattern and take the number of people expressed in the display and finally reduce the running time and issue of non-top.



Initial bus prepayment system





9:27

시외버스터미널

울산과학기술원



< 결제 카드 선택

학생증 1444



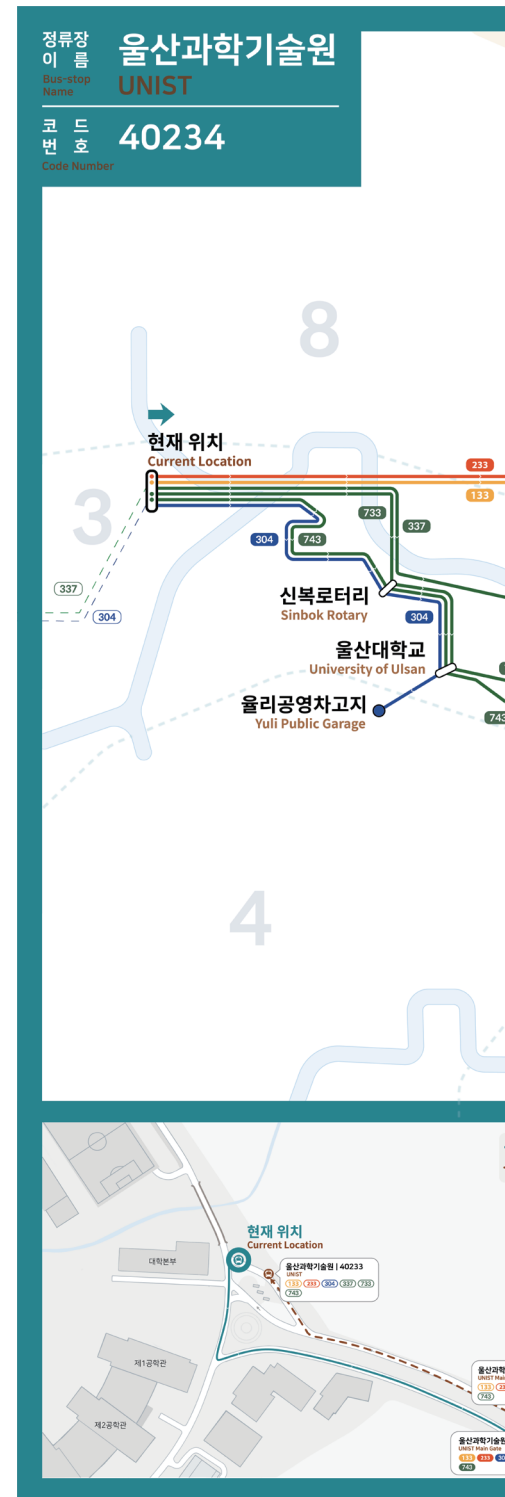
버스 이용 1회

결제 금액 1,250원

Outcome

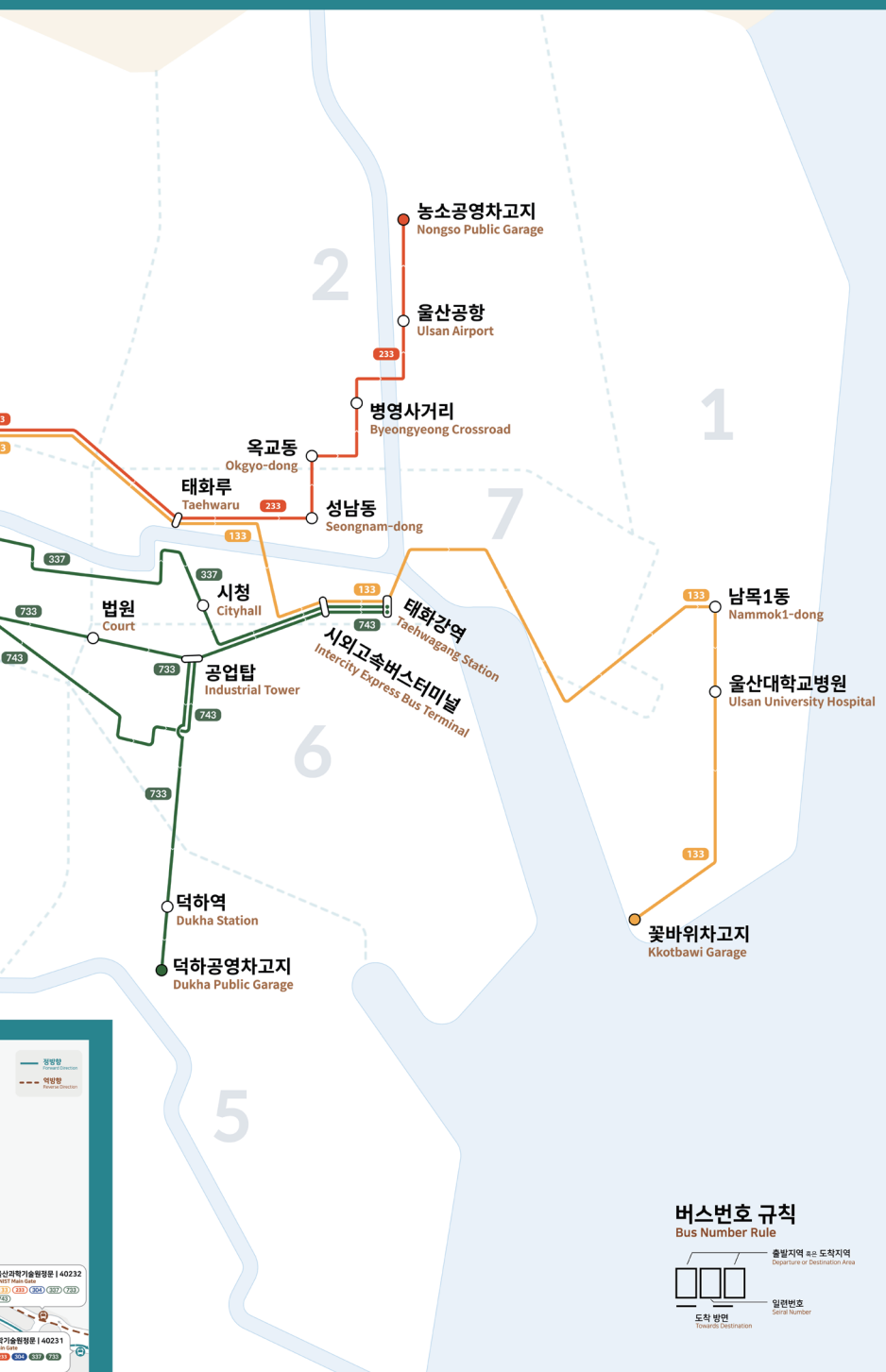
Ulsan Bus Route Map

By explaining the principle of the bus numbers and visualizing the applied route over the key areas, passengers can now see information about the bus they need to board at a glance.



Different colors by designation areas

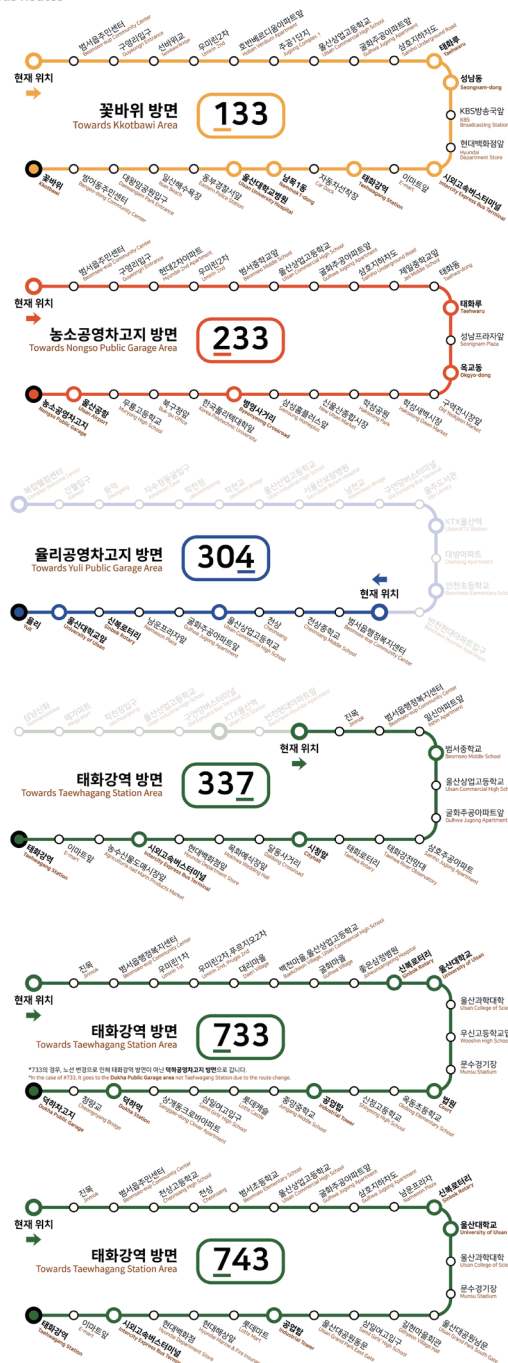
Each destination has its own color, so it makes easy to understand the direction each bus heading at a glance. In addition, the same color as the bus route list on the right side makes unity with map.



Info. about bus-stop nearby

By showing a map around the current location, people can see the directions and numbers of the buses passing through there, as well as the buses going through the other bus stops around.

버스 노선 Bus Routes



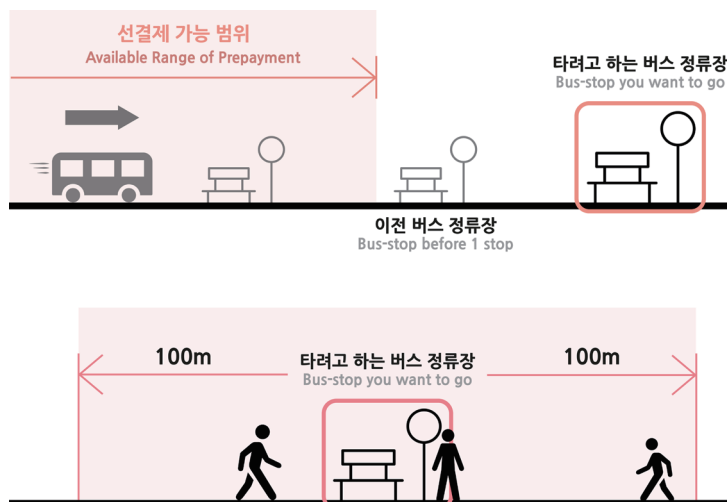
Info. that explains more kindly

It is easy to understand related to the bus system by showing the bus number rules on a map, and all information is written down in English also that foreigners can use the bus.

Passengers can pay for the bus they want to board in advance using their smartphone, which informs the driver in advance, reducing the anxiety of missing the bus. Then, the passengers get peace of mind with prepayment system.

Also, it makes bus drivers reduce stress. This reduces the time spent for payment when passengers are boarding the bus, thereby reducing the burden on the bus driver's turnaround time, and at the same time reducing the complaints of passengers about non-stop issues.

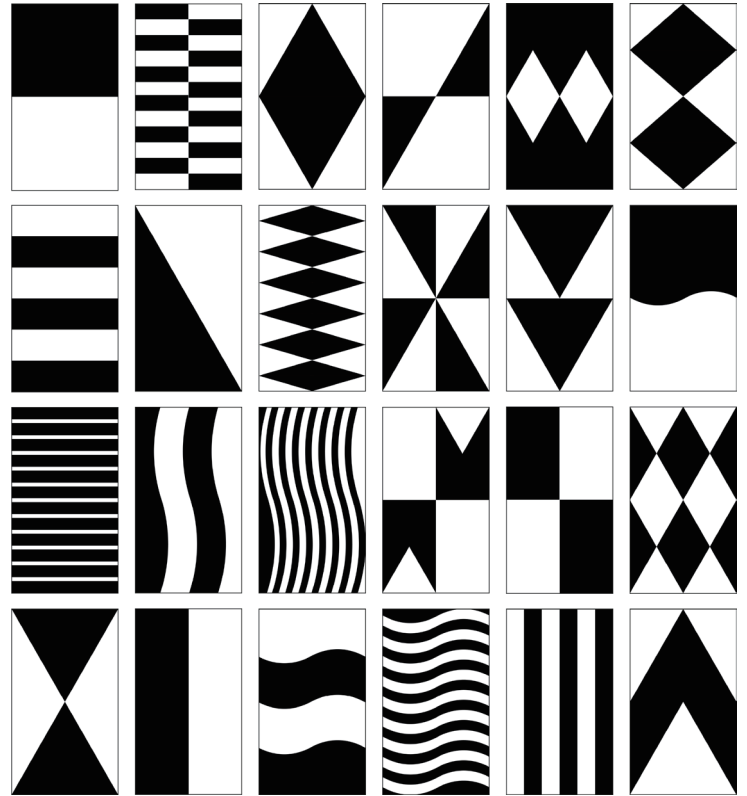
Furthermore, it helps municipalities manage and improve their bus lines. They can gather data by app payment about where people take, transit and get off the bus, which helps them to plan and redesign their bus lines based on real needs.



Two rules for pre-pay

Various patterns for payment →

Checking if the pattern is correct or not is giving the bus driver another task. Therefore, it has been changed to a very simple shape to be identified at a glance. Since some people can take a screenshot of the ticket screen and abuse it, it randomly changes to a different shape of pattern over a 5-minute interval. For example, if it was a diamond at first, it turns into a rectangle, and then it turns into a wave.



↓ Check the pattern on the Bus

As a passenger boards the bus, a display next to the bus driver shows the pattern of the people who currently pay and how many people need to ride.







Epilogue

Baas



“What factors can enhance the bus experience in most cities without metro in a smartphone-era?”

Do you have any difficulties during this project?

First, when interviewing the passengers, it wasn't easy at first to continue digging into contextual questions within 10 minutes at the bus-stop before getting on the bus. And because of the COVID-19, it was difficult to start because I feared that I would feel distant from asking for an interview. Also, the fun thing was that I was interviewing a woman around lunchtime, but there was an experience in which someone next to her came and answered with me and became interested and emphasized with my topic.

Second, This project was the first time I made a map form graphically, so the first challenge was what kind of information should be displayed. So, I am looking forward to creating a map that can be applied in practice if the route map is programmed later. And in the initial design of the route map, each person has a different view of the map, and there are some who caught my intention at once and others who did not. So, to eliminate this case as much as possible, I went back to the beginning and made it. After going through iteration three times like this,

I felt good because people's reviews were much better than the initial designs in the exhibition.

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

I think that's because I've been living in Ulsan for five years and sympathizing enough with this issue. And the desire to solve these problems in this way was the driving force, and it seems that I continued to lead the project. Also, the professor gave me good guidance! Haha- It's not joking. He supported me well. I saw and learned a lot of essential things like a designer's mind and attitude and time management. Professor Seungho Lee, thank you sooooo much!

Do you have any plan to develop this project?

Actually, I showed BaaS's very early state in the exhibition. There were so many topics I wanted to cover, so I got lost in the beginning. Next, in the bus route map case, I plan to recreate it with the cost and A/S issues, and in the case of prepayment, I am thinking of creating an entire bus app and add it there. And I plan to expand the

“What factors can enhance the bus experience in most cities without metro in a smartphone-era?”

exterior of the bus stop, its rules, and how to improve UX inside further. Also, my personal wish is to cooperate with Ulsan City Hall to use the route map I created for the changed routes that will be introduced from next year.

Is there any motivation to become a designer?

When I was interviewing at UNIST, I wanted to be a mechanical engineer who designs wind turbines. Also, I especially loved physics, so I wanted to major in astrophysics or particle physics. Once, I was interested in engineering college design, so after taking some design courses, I had a plan to transfer to mechanical engineering or physics. But, I did a whole semester as a design major, and now I'm a Master's student in the department of Design. While taking some classes, I thought that design is the most important thing for the future to come. No matter how advanced the technology is, "Is it practically usable?" "Is it easy to use?" or "Is it reluctant?" I started to think that these are important points. Besides, there was a belief that design could be combined with other fields because the spectrum of design is broad. And I decided to become a designer with the determination to create a culture based on my products, services, and UX.

Last words?

This project marks the end of my undergraduate life, the beginning of my master's program. After it was over, I was able to look back on my entire UNIST life, and there were a lot of people who were really grateful. First of all, I would like to express my gratitude and respect to my family and professor Seungho Lee, my supervisor. And I am very thankful to professor Huiseung Lee, the former lab advisor. He taught me a lot inside and outside of design. Although it's a TA, thank you to Seunghoon for always paying attention to him as he exhibited, Byeongkuk, who shared this fall semester, and the New Design Studio crew(Sungwon, Hyori, Jonghyun) who helped. And my DECS Lab members, Sungho(a wonderful my senior who has been helping me from the beginning of DECS Lab. I could have many experiences with him, especially in CHI2019, England), Donghoon(a professional who always takes care of and helps me), Byounghern(still helpful and kind like his own work), and Sookyo(a professional when he works, and a best friend when I was in DECS Lab). Also, Sungjun and Sangjin of other labs, nice seniors. Thank you all About_ crew(Minseop, Seungheon, Jiyoung, Sungwon, Dongjun). Finally, I would like to express my gratitude and respect to my girlfriend. Thank you to all of you who read the article, and if you are interested in this project, please contact me!

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* All other visual contents were created by Seongbeom Kim, the author of this issue.

