

04 VibraConnect

Engineering design | Interaction design | Accessibility design

Project brief:

This project designs a system for **delivery workers with hearing impairments**, creating a more friendly, connected, and accessible community.

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RESEARCH

According to the World Report on Hearing, about 20% of the global population has some hearing loss, and severe hearing loss often limits job opportunities. However, the food delivery industry offers high income and easy entry, creating new opportunities for people with hearing impairments. As a result, many have become hearing-impaired delivery riders, which is called **DHH delivery riders**.

Delivery riders skills

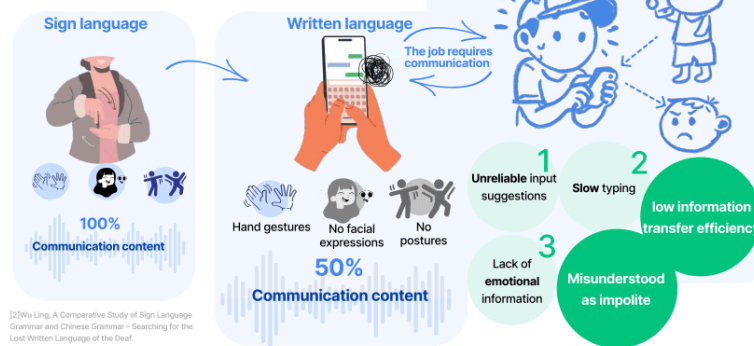
In China, countless delivery riders **ride electric bikes** through the streets and alleys to make a living. To earn a higher salary, they need to possess a variety of **skills**.



Hearing impairment in delivery

Written communication barriers

Converting sign language into written language^[2]



^[2]Wu Ling, A Comparative Study of Signs Language Grammar and Chinese Grammar - Searching for the Lost Written Language of the Deaf.

Care and understanding



^[3]Yang Xiaosheng, A Study on the Current Situation and Social Protection Issues of Delivery Riders

Riding safety

One characteristic of the food delivery industry is '**speed**,' which means delivering orders on time, taking more orders, and earning more money. This has also partially contributed to the **safety issues** faced by delivery riders.^[3]^[4]



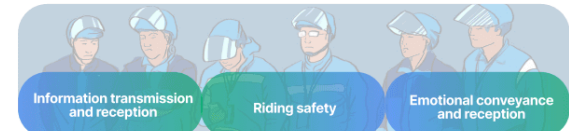
In contextual inquiry, We found that, unlike other riders, DHH riders frequently rely more on visual cues to check their phones for information, which poses a greater danger. Then I listed the **functional information** they often received.



^[4]Jiang, Xuefeng, "Sustainability Development Survey Report on Delivery Riders," Beijing News

Conclusion

Currently, delivery riders generally lack social interaction and participation, which causes significant psychological stress for this group^[5]. The following is the conclusion I have summarized.

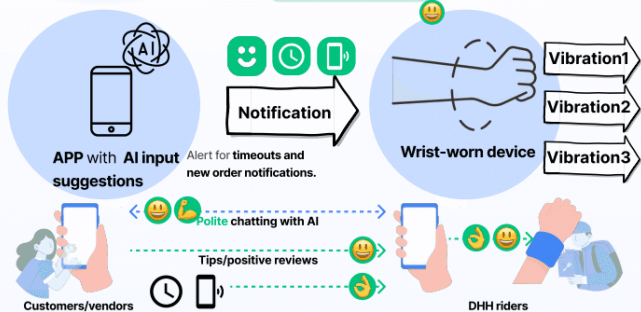


^[5]Fanghong Dong, Relationships between racial discrimination, social isolation, and mental health among international Asian graduate students during the COVID-19 pandemic.

^[1]Zhao Lei, Walking with Digital Technology: A Study of the Labor Process from the Perspective of the Co-construction of Technology and Skills—A Case Study of Delivery Riders.

CONCEPT

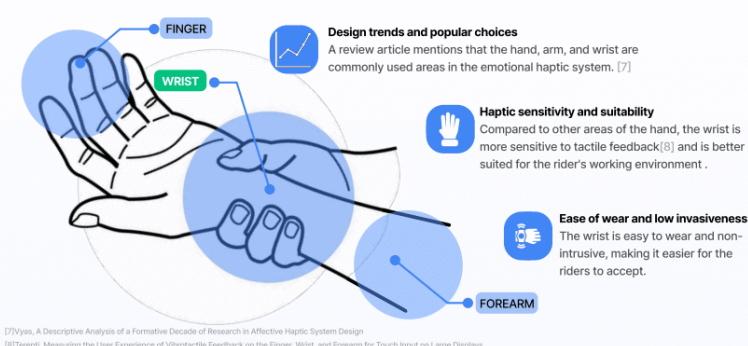
We aim to use an **app + a haptic wearable device** to achieve **safer and more efficient** information transmission and reception, while also facilitating **positive and polite emotional** conveyance and reception.



Why did we choose to use haptic(vibration)?

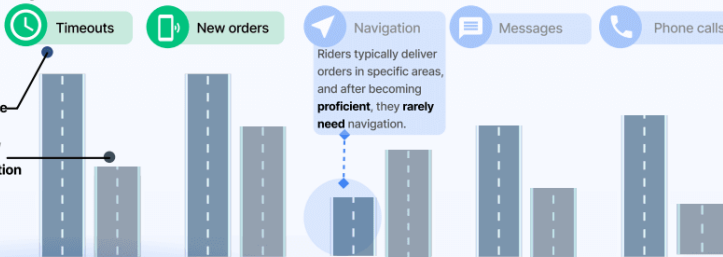
- Selection of most existing methods**
Most existing DHH assistive methods use visual and haptic feedback to replace or compensate for their hearing.[6]
- Effectiveness of haptic information transmission**
My research during my internship has shown that haptic feedback can effectively convey both functional and emotional information.
- Replace the auditory channel and reduce visual load**
DHH riders need to focus their vision on traffic conditions, but haptic sensation has not been fully used, which can help DHH riders. [6]

Why choose the wrist?



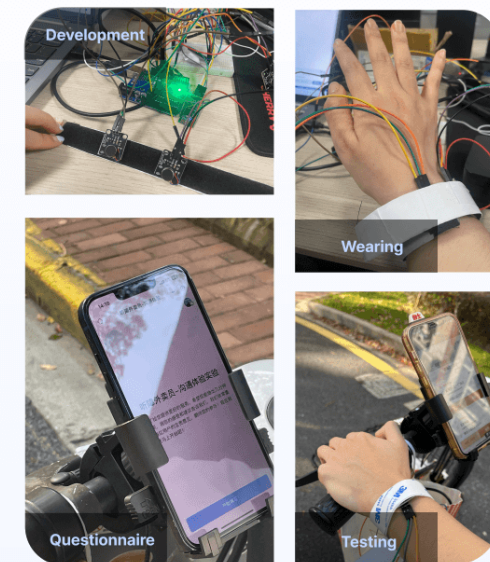
Why did we choose to alert for these two functional information?

During the driving process, only the vibration alerts for higher-priority notifications are retained to **reduce the cognitive load** for DHH riders using the wearable device.

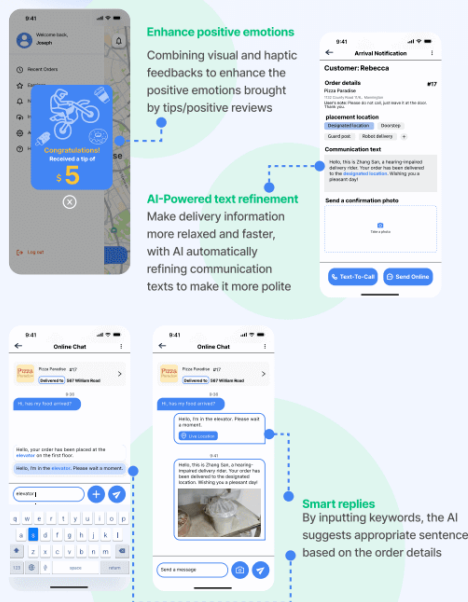


How to enhance the positive emotions?

I chose to use vibration to enhance the positive emotions from tips/positive reviews, **designing specific vibration patterns**. Our **user experiment** has shown that **vibration effectively** complements and enhances the positive emotions conveyed through visuals.



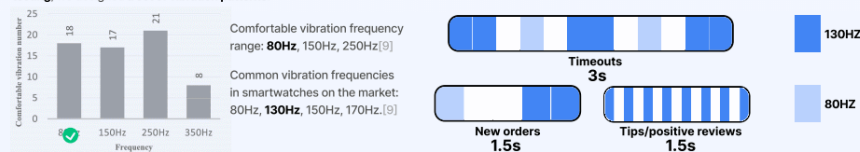
MOBILE DESIGN



PATTERN INTERACTION ITERATION

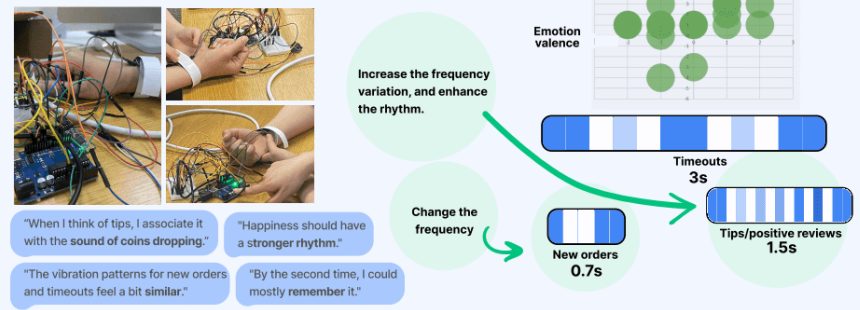
Vibration pattern design v1

Referencing to several papers, we first envisioned and conceptualized the **rhythm** of order timeouts, new orders, and tips, then applied these concepts to our prototype. Through continuous **internal testing**, we designed a **set of vibration patterns**.



Vibration pattern design v2

We recruited 20 volunteers for **user testing** and collected their feedbacks. Based on their feedback, we **iterated** on the vibration patterns.



REFLECTIONS

Algorithm

In the food delivery industry, algorithms help design more efficient pick-up and delivery routes, but they overlook the **emotional needs** of delivery riders, turning them into **robots**.



The algorithm's **averaging** approach does not take into account DHH riders, who need more time to deliver food.



I found that not only can DHH delivery riders benefit from this, but **other delivery riders can also use it**, our product can help them to build a more friendly and connected society.

Balancing Customer Rights

A consumer once posted on social media saying, 'I understand their difficulties, but I also work very hard every day. What's wrong with my order on time?' 'Why should I have to bear the cost of delayed delivery?' Therefore, when we call for more care and understanding for delivery riders, we must also consider the **interests of customers and other stakeholders**.