



SDE-773

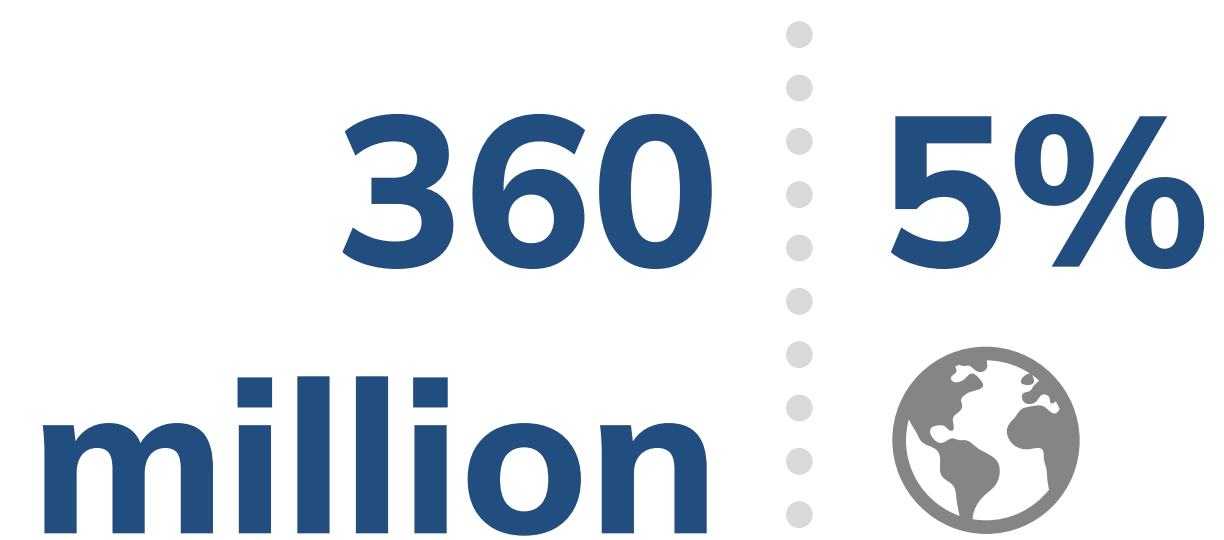
Deaf and Hearing Disabilities

Accessibility in Interaction Design

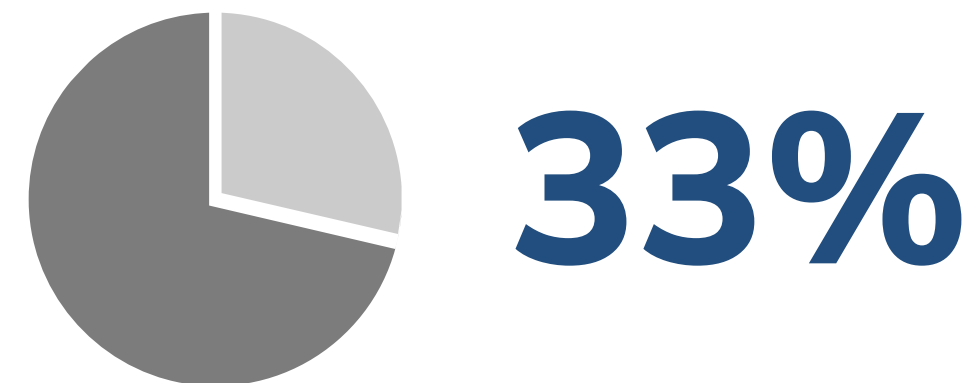
Team: Elon Skolnik , Karishma Pawar, Vaibhav Gaikwad

Secondary Research

According to **WHO**, hearing loss and deafness are serious problems all over the world.



of the world's population has disabling hearing loss



of people over 65 years of age are affected by disabling hearing loss



Current production of hearing aids meets less than 10% of the global need.

Difficulties Affecting the Hearing Impaired

Fewer Education and Job Opportunities

Public announcements

Driving a vehicle and public transportation

Social isolation, loneliness and stigma

Going to movies and other social events

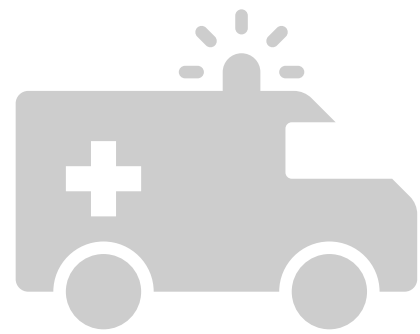
Being in the dark

Low in self-esteem and confidence causing emotional stress

Caring for hearing aids

How Does Hearing Loss Affect Driving?

While sight is the most crucial sense for driving, a lot of important information comes from sound.



Emergency sirens influence drivers to pull over or redirect



Honking cars may be indicative of an issue with your driving or vehicle



Unusual sounds coming from the engine alert you of maintenance problems

Problem Statement

Drivers rely on sound for important road safety information, such as **emergency sirens** and **other drivers honking their horns**.

According to the CDC, **nearly 16% of US adults** report some form of hearing loss. Even more drivers tend to listen to **music and podcasts at high volumes** which impacts their ability to hear the road outside.

This leaves a high proportion of drivers, even with normal hearing, missing out on **essential information** which is currently conveyed only through sound. Those with hearing impairments have even further difficulty.

Persevering Peter



Age: **49 years**

User type:

Opportunistic

Hard-working

Exploratory lifestyle

“I love to drive but sometimes my passengers doubt my ability when they discover I’m hard of hearing.”

I

Goals/Needs

- To navigate through the city safely despite his hearing loss
- Assure his passengers of their safety while in his car
- Know what’s going on around him while driving at all times
- Go to events and concerts and have fun with his friends

Pain Points

- Hearing aid often overwhelms him with sound when driving in the noisy city
- Being denied the ability to rent or test drive a car
- Police often aren't friendly or understanding to Deaf people
- Fears that if he becomes involved in an accident, it is hard to prove he wasn't at fault

“

Drivers who are deaf or hard of hearing often adjust their driver safety habits by relying more on their sense of sight to compensate for the loss of hearing ”

THAT DEAF GUY

BY MATT & KAY DAIGLE

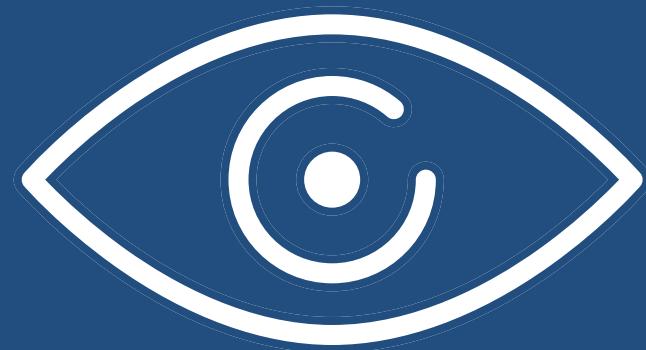


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How might we

help hearing-impaired drivers stay alert while driving by giving them more visual information about their surroundings?

Driving distractions



Visual



Manual



Audio



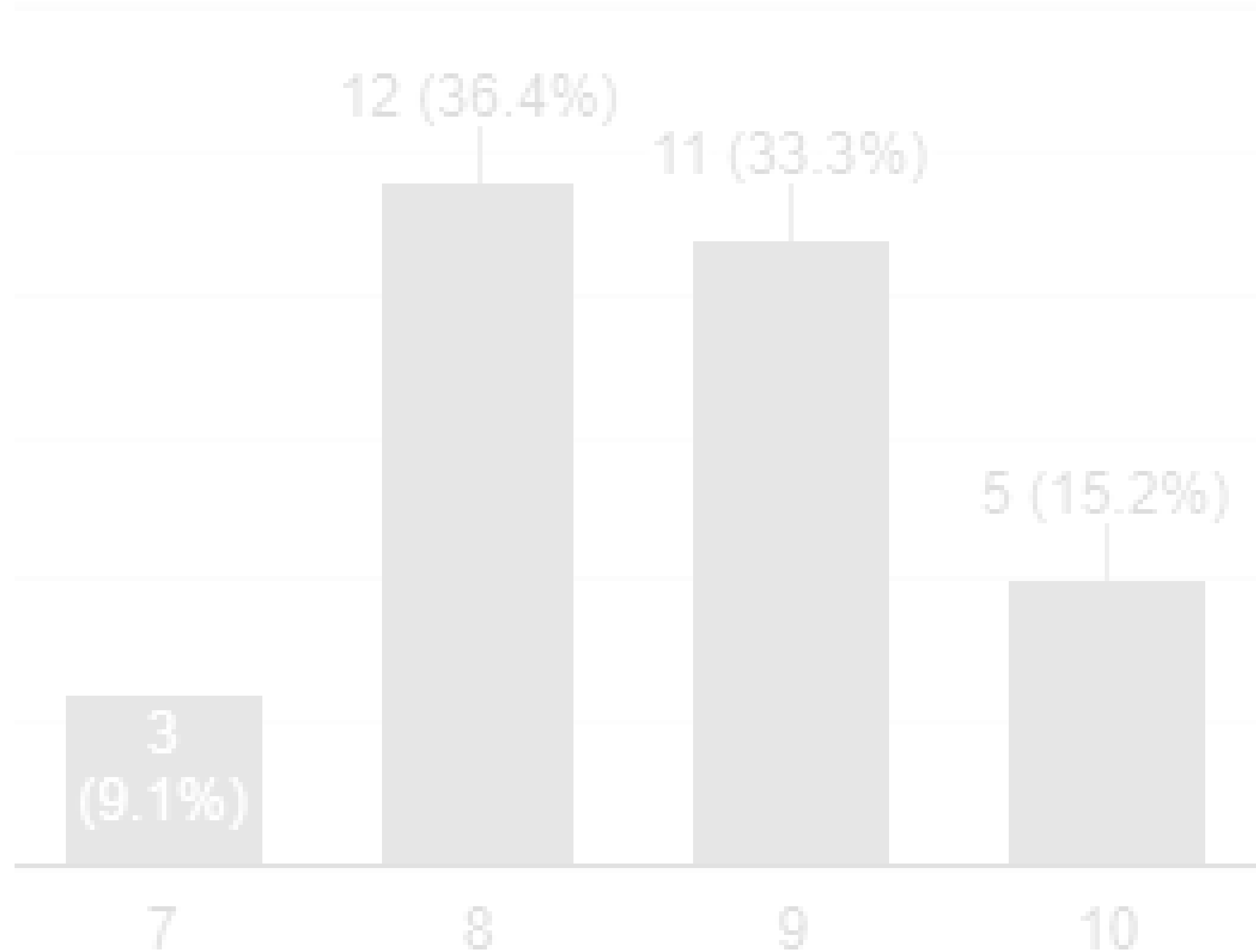
Cognitive

Research Methods: User Survey

*note these responses are skewed toward younger audience

33 respondents

↳ **3** with auditory processing disorder



Survey Stats- Distracted Driving

 **77%**

listen to music/podcasts
often or always

 **90%**

listen at a volume of 5
out of 10 or more

 **88%**

 **19%**

look at their phones

 **24%**

eat a snack

 **42%**

adjust their
entertainment screens

Survey Stats- Safety

42%*

sometimes have difficulty
placing where an emergency
siren is coming from.



*note these survey respondents are mainly unaffected by hearing problems

How might we

communicate critical information about road safety
without using sound alone?

RoadWary

a visual driving assistant



What's the idea?

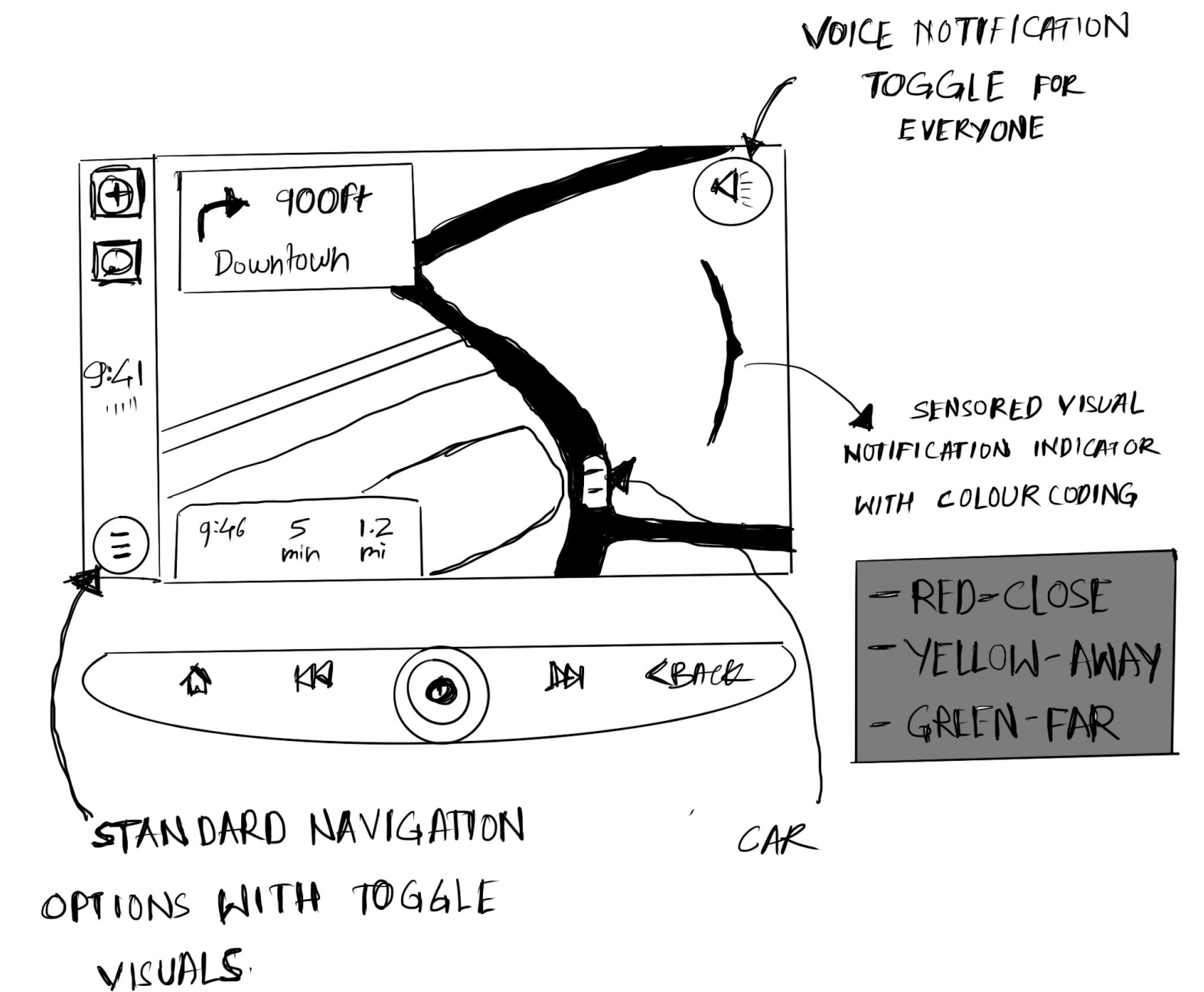
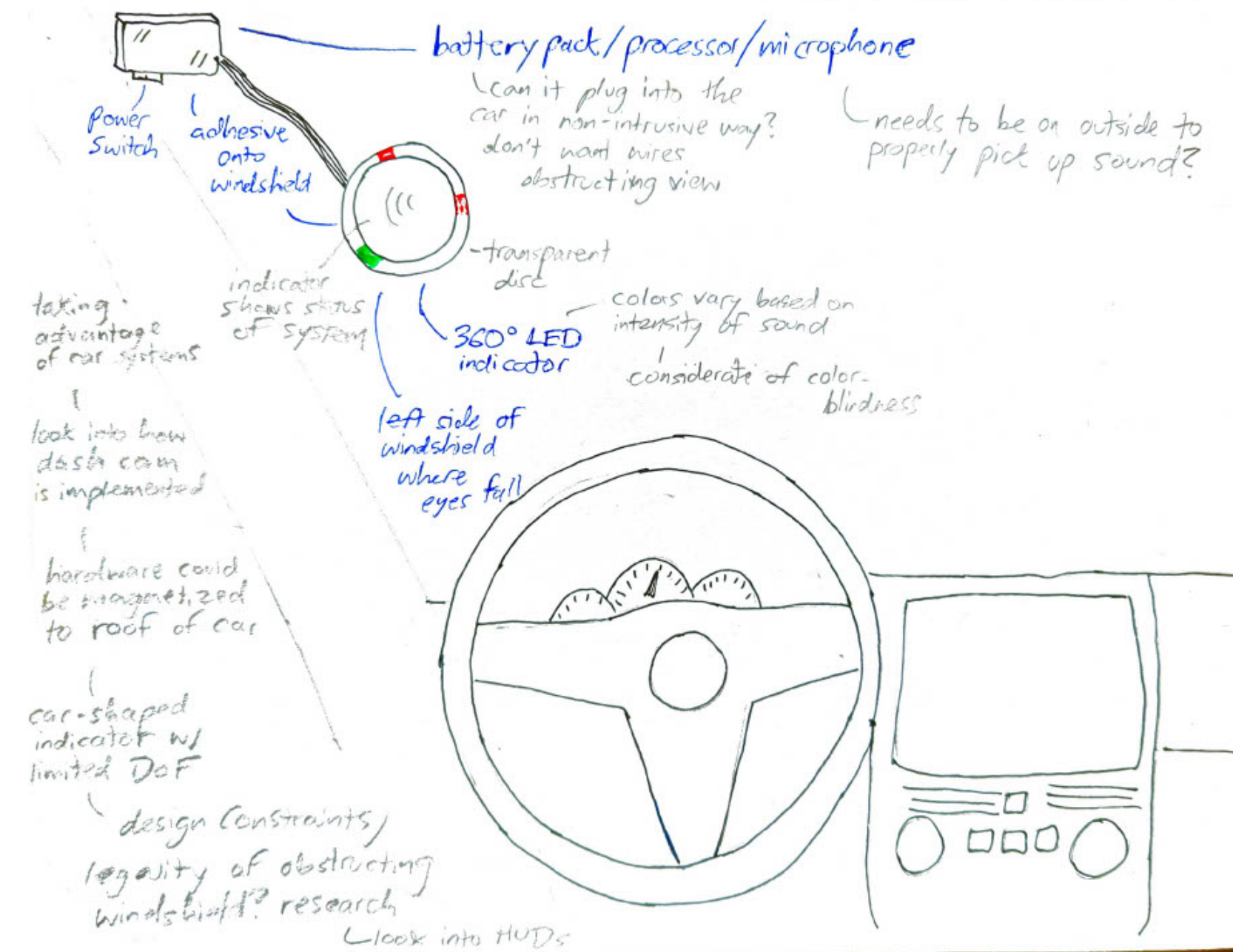
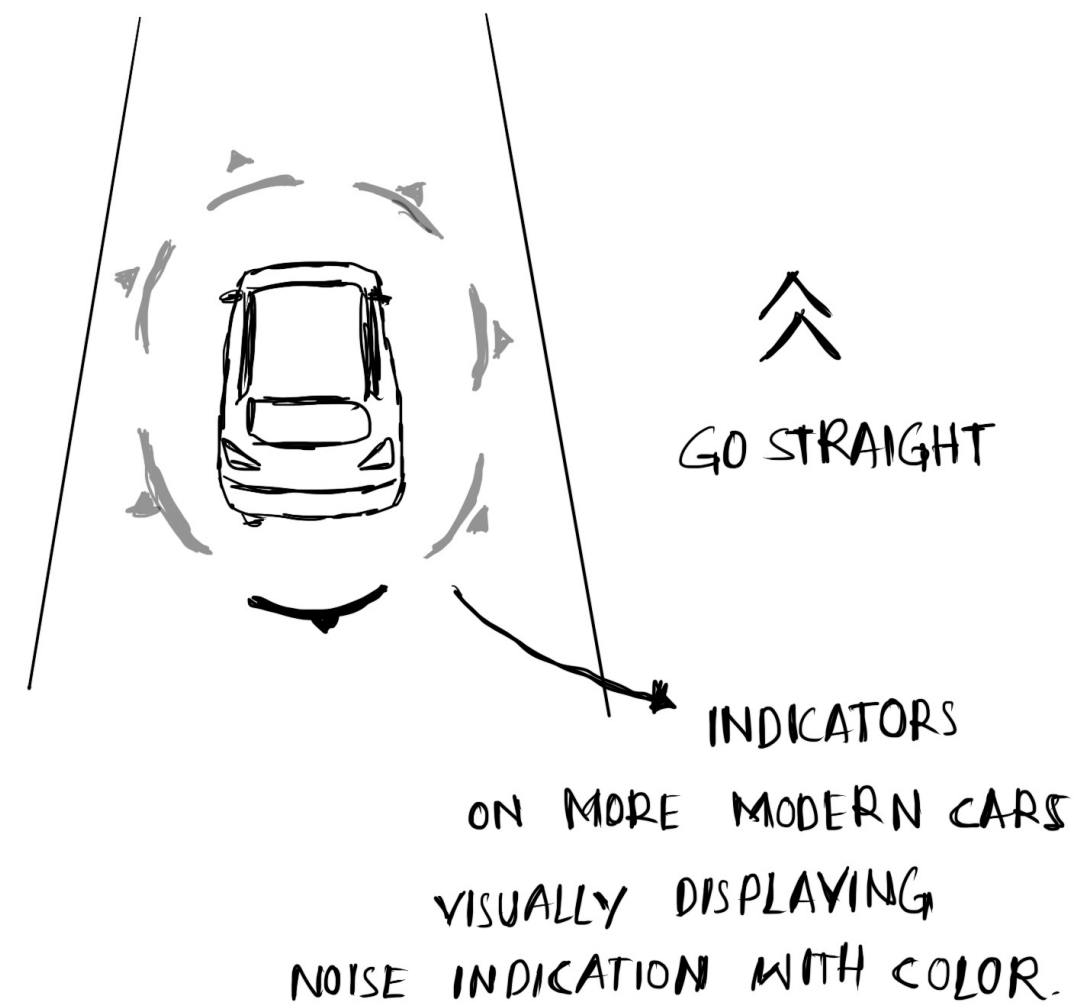
RoadWary is a dashboard-mounted device which converts important sounds like emergency sirens and honks into an easily understandable visual display.

With a focus on universal design, RoadWary intends to help hearing-impaired and unimpaired drivers alike.



Product Explorations

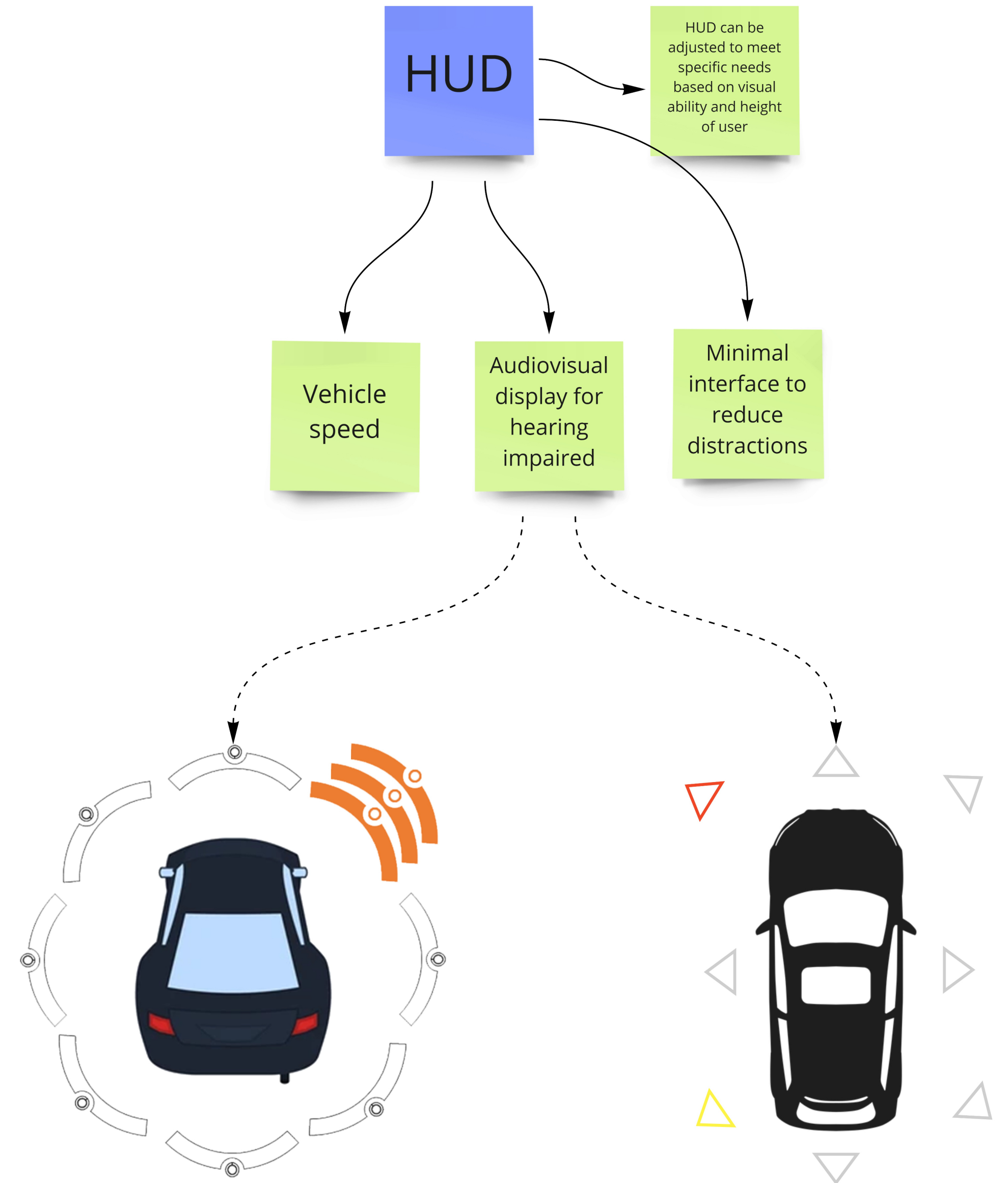
42 MINUTES TO ARRIVE
12 MILES 16:24



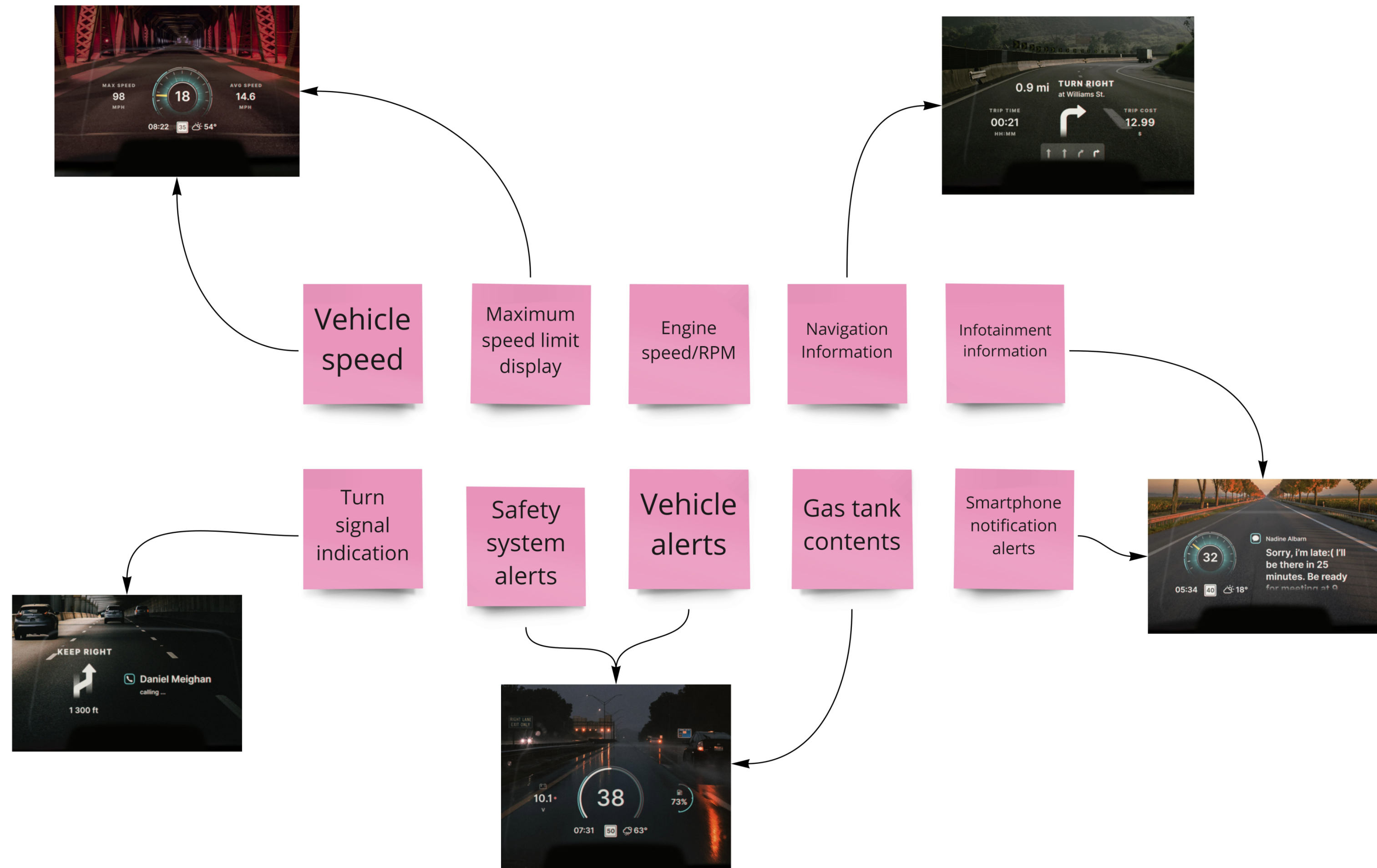
What is a Heads-Up Display and how is it used?

A heads-up display, or HUD, is a technology that projects an image onto the vehicle's windshield or panel, just beneath the driver's line of sight.

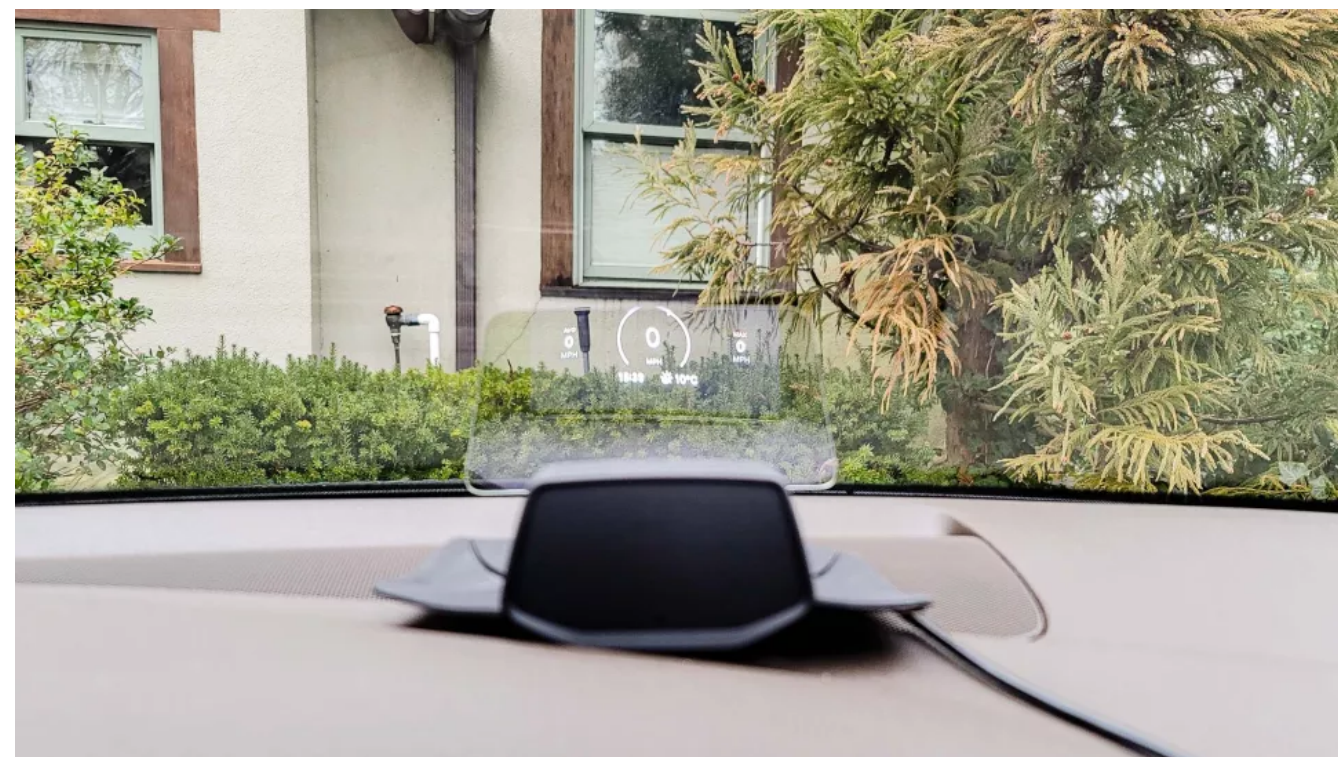
It provides various information but doesn't require the driver to take their eyes off the road.



Existing HUD Features



Competitive Analysis



Hudway Drive



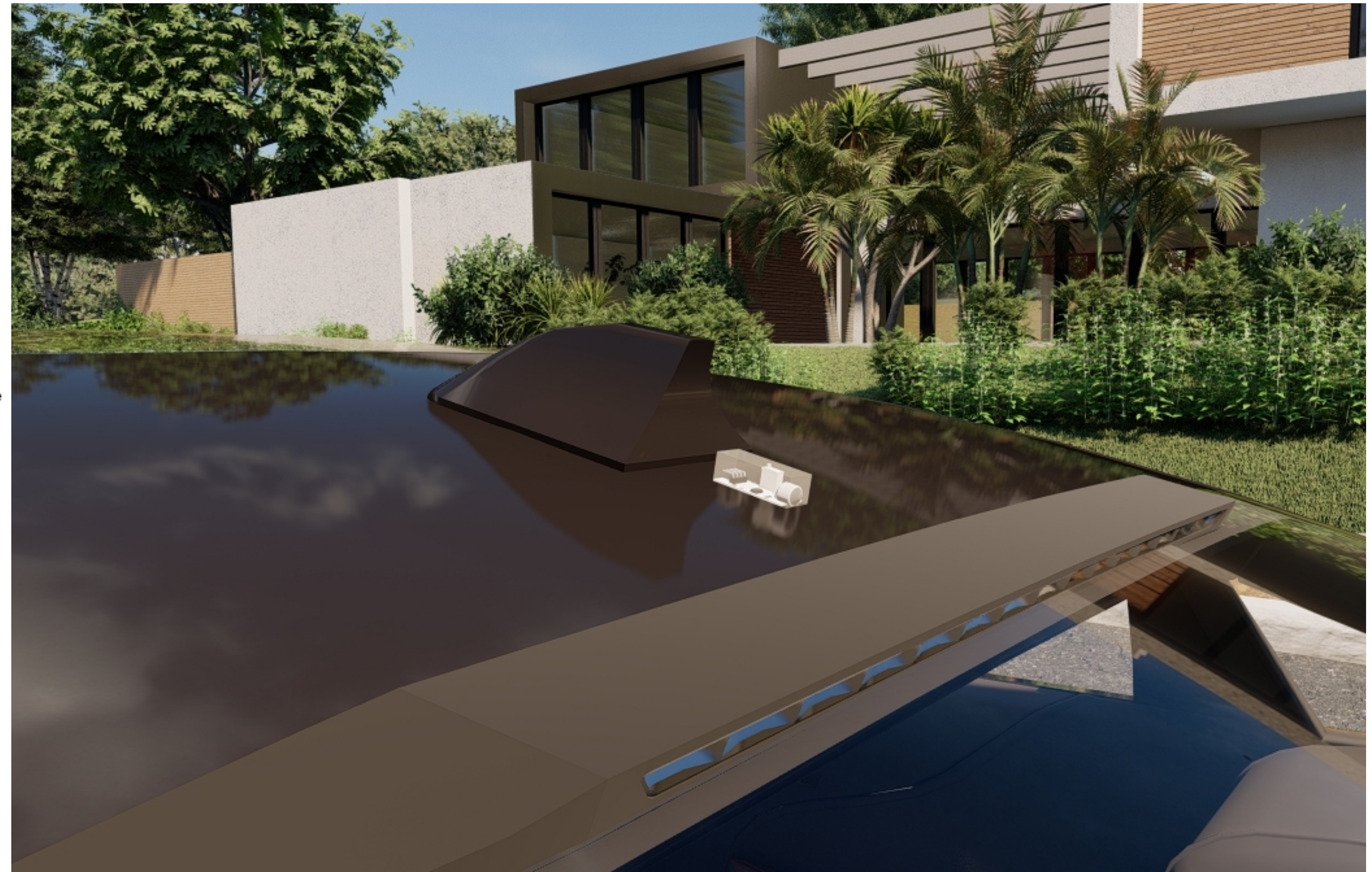
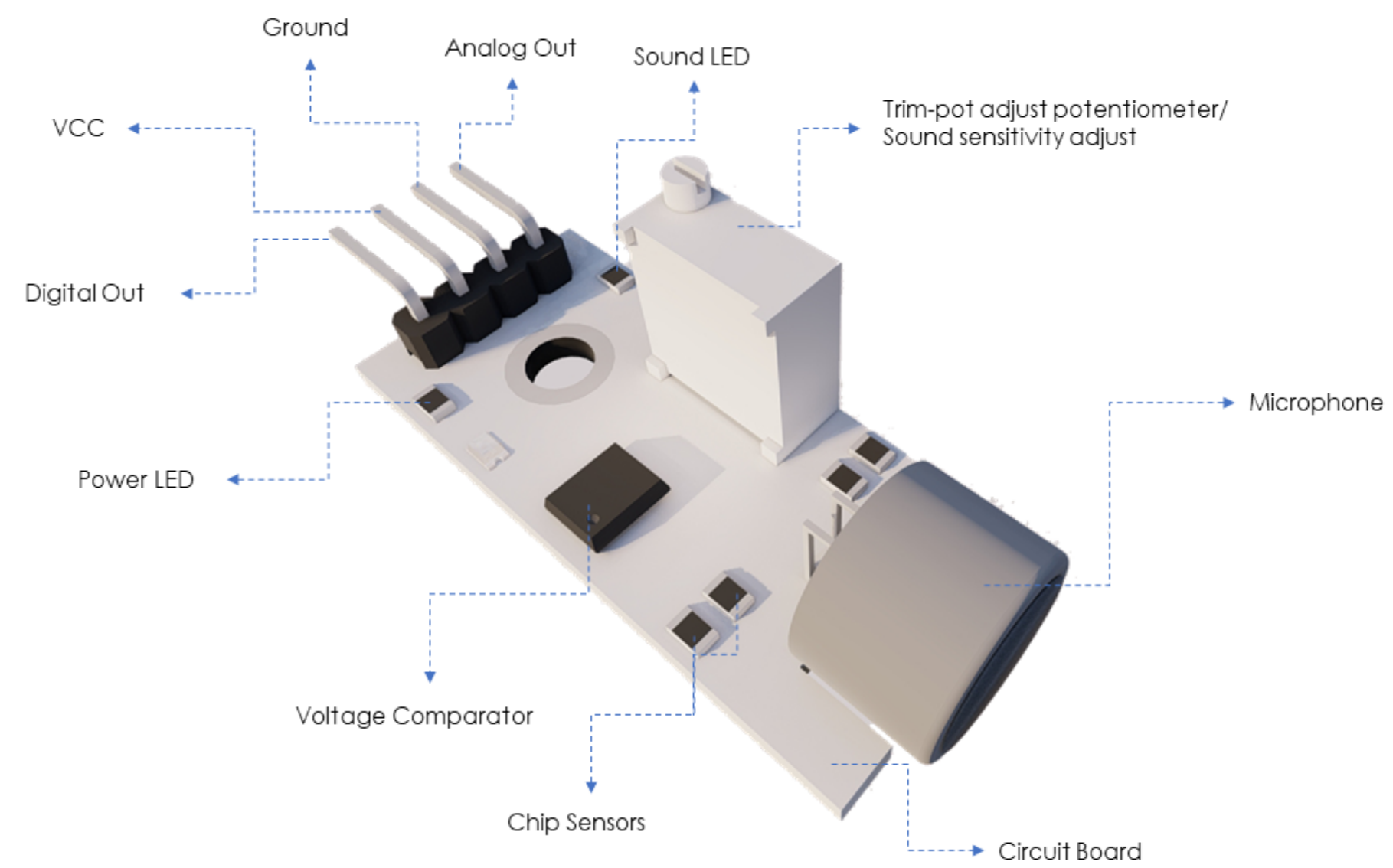
Pyle PHUD180BD



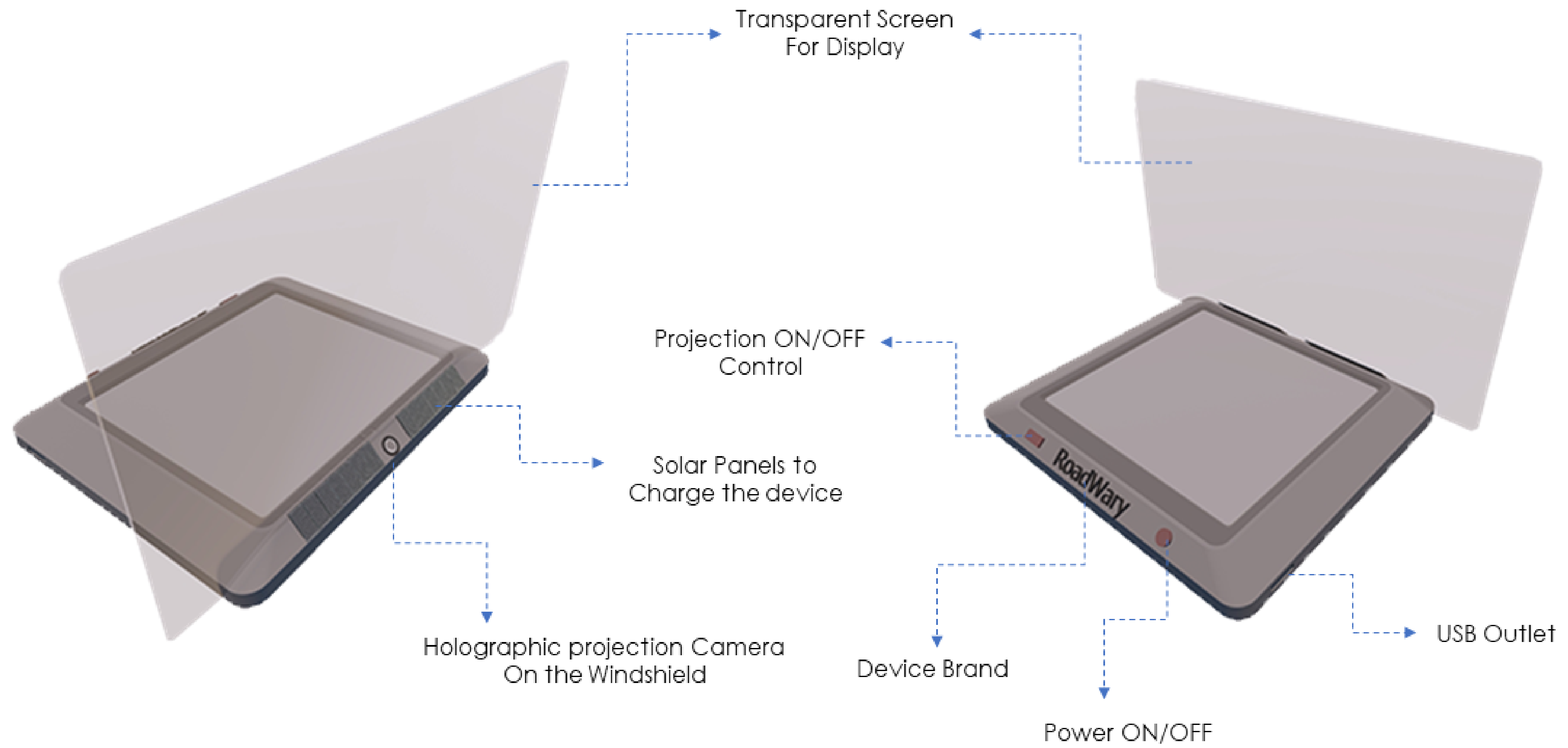
Akabane A500



RoadWary Sensor



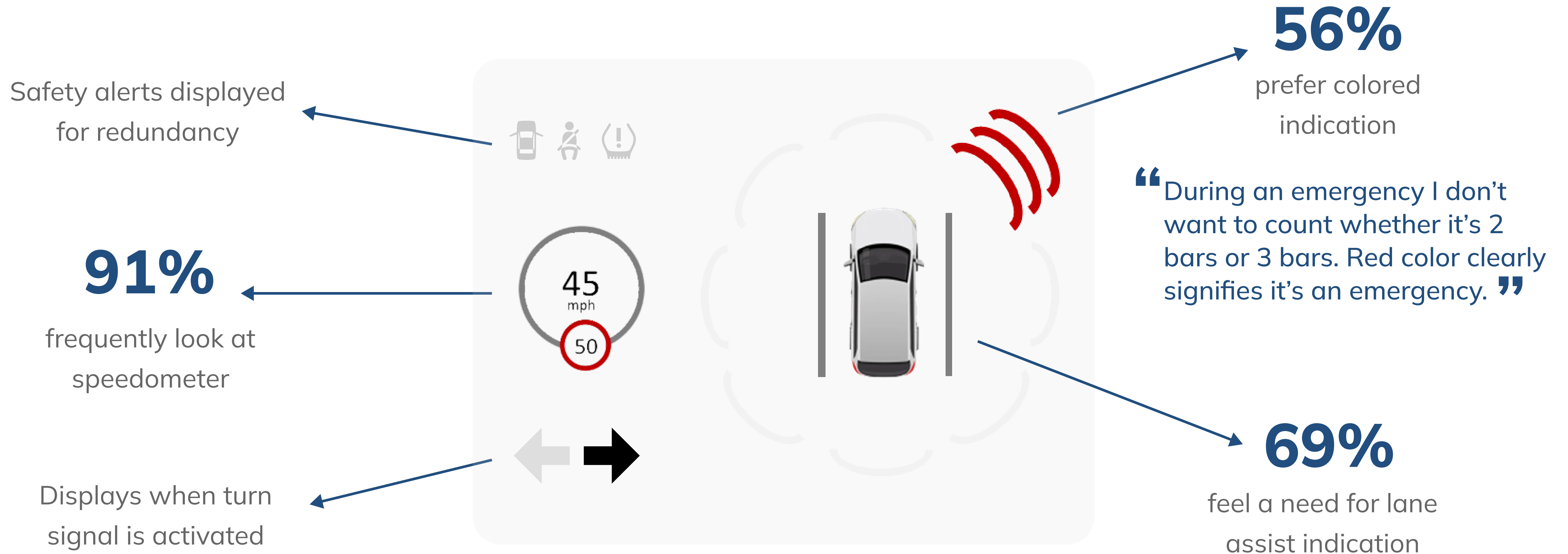
RoadWary HUD



RoadWary HUD



Validation: Survey



Validation: Pretotyping (Size)



4" x 4"



6" x 6"



Validation: Pretotyping (Time of Day)



Daytime



Nighttime



Validation: Pretotyping (Placement)

Driver's side

Eye-level



Center console



Low



Next Steps



- Build a functioning prototype
- Conduct user testing with hearing-impaired drivers
- Refine and iterate on product
- Create business model
- Release beta version to public



Thank you!