

Honors Capstone: Human Machine Interface Design for Enhanced Accessibility

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Agenda

1. Project background
2. Project timeline
3. Demo of final product
4. Recommendations & reflection

Background

How We Got Involved

- We are interested in autonomous vehicles and human machine interface design
- Applied to this project in the MDP program and got accepted



COLLEGE OF ENGINEERING
MULTIDISCIPLINARY DESIGN PROGRAM
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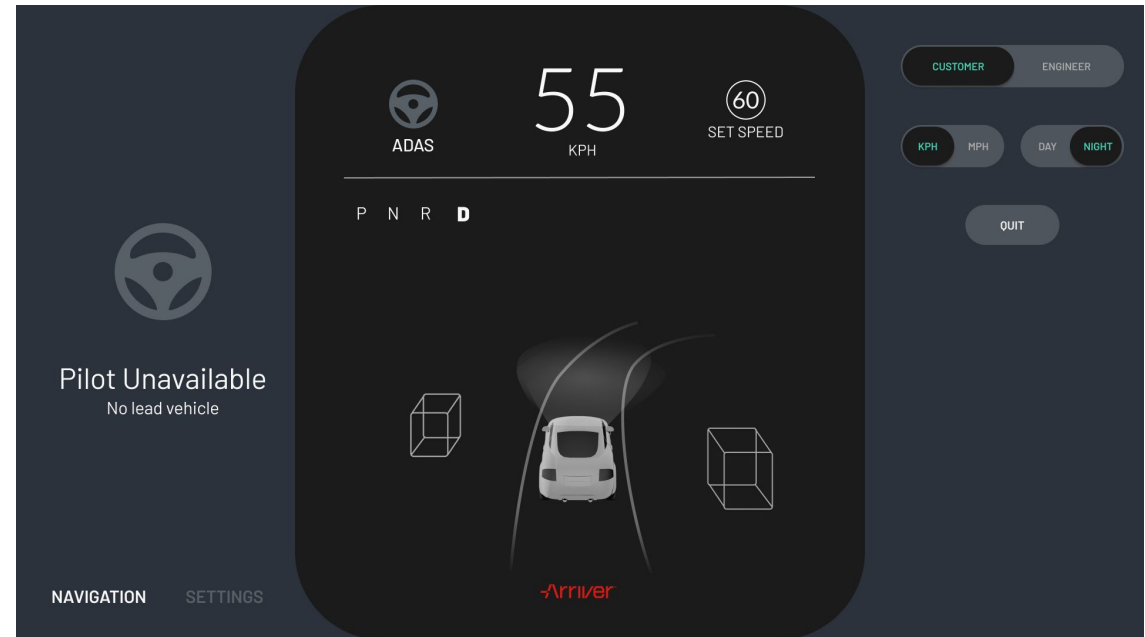
Sponsor Introduction: Arriver

- A software company created for the delivery of Advanced Driver Assistance Systems and Autonomous Driving solutions
- Three main areas of focus:
 - Sensor perception
 - Drive policy
 - Human machine interaction
- Currently working on autonomous driving solutions from level 1 to level 4



Problem

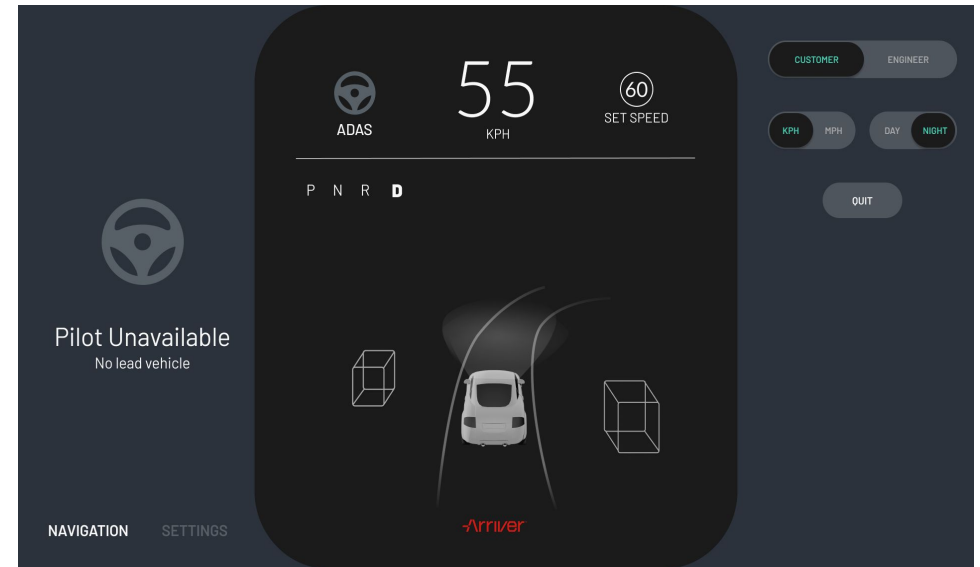
For **safety critical** driver alert systems to be **universally effective**, they must be designed with the broad population in mind, including people with **accessibility needs**



Arriver's Original HMI

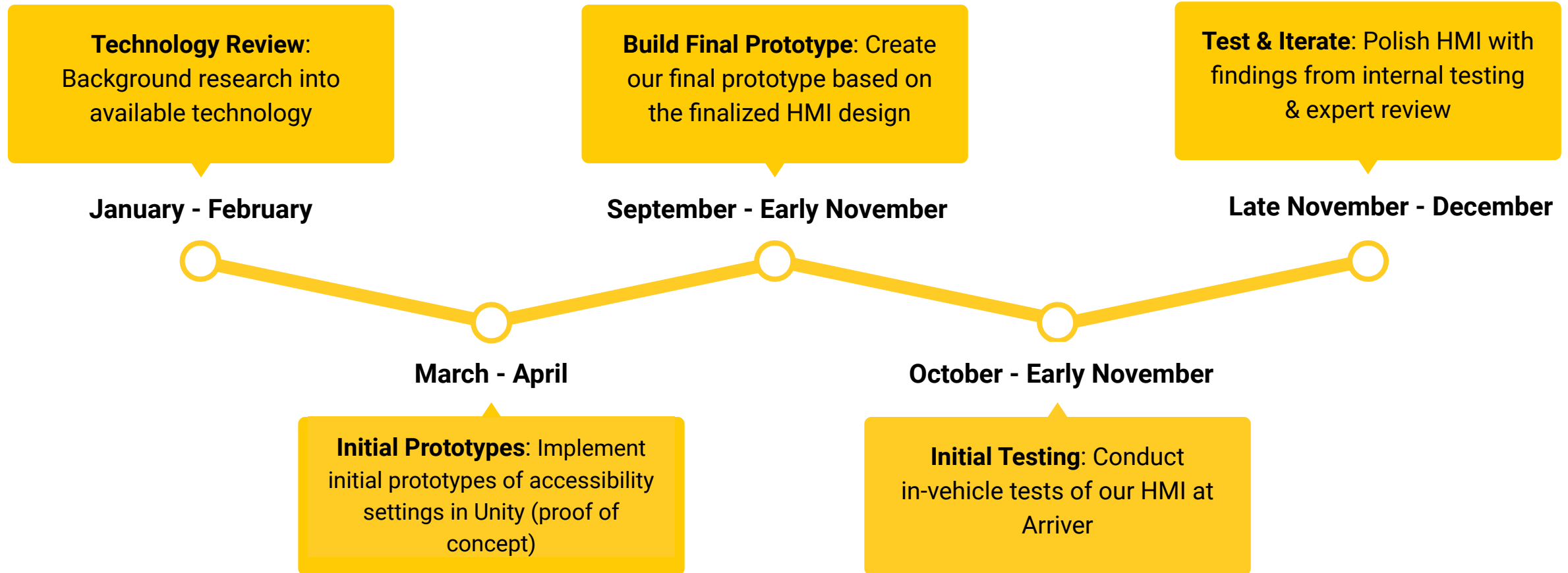
Project Goals

- We researched and developed accessibility settings to improve the usability of Arriver's interface for people with accessibility needs
- Expanded on the original interface



Arriver's HMI

Our Timeline

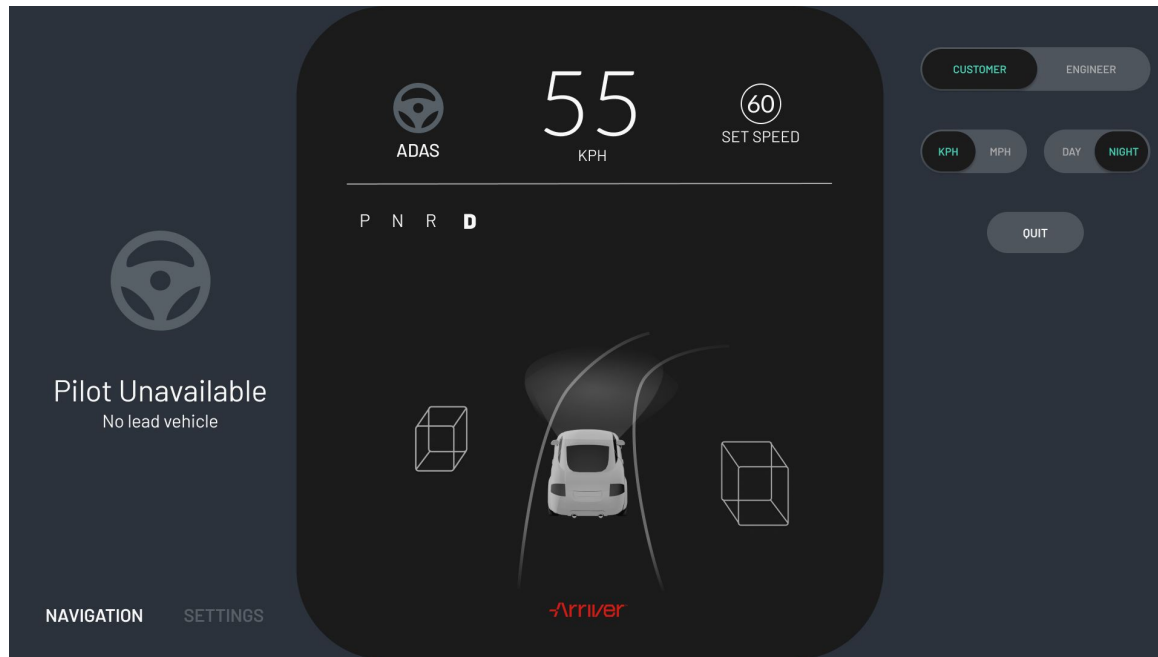


Final Deliverable

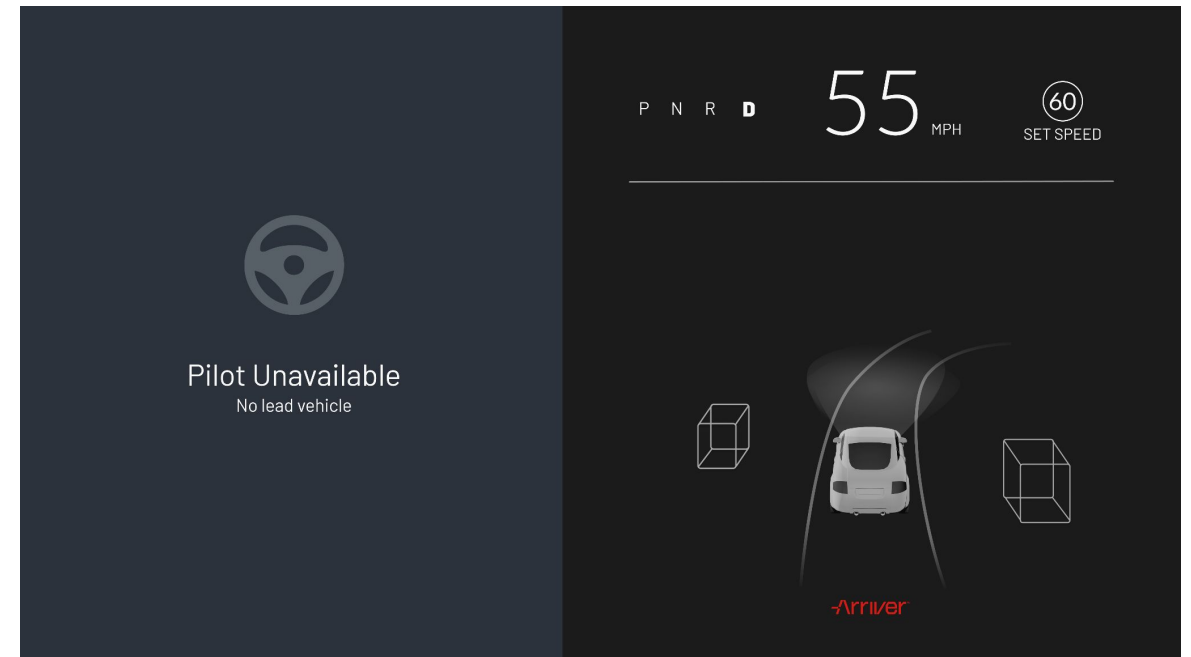
- Github repo/zip file of final HMI
- Figma design templates
- Supporting documentation for accessibility features

Final HMI

Base HMI Changes

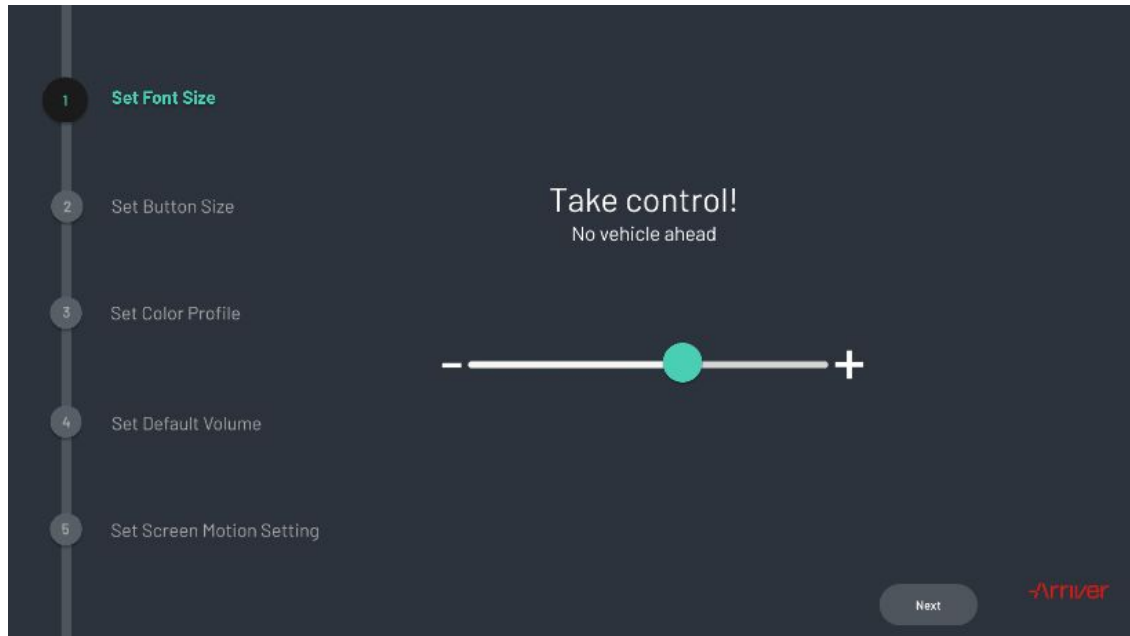


Original HMI

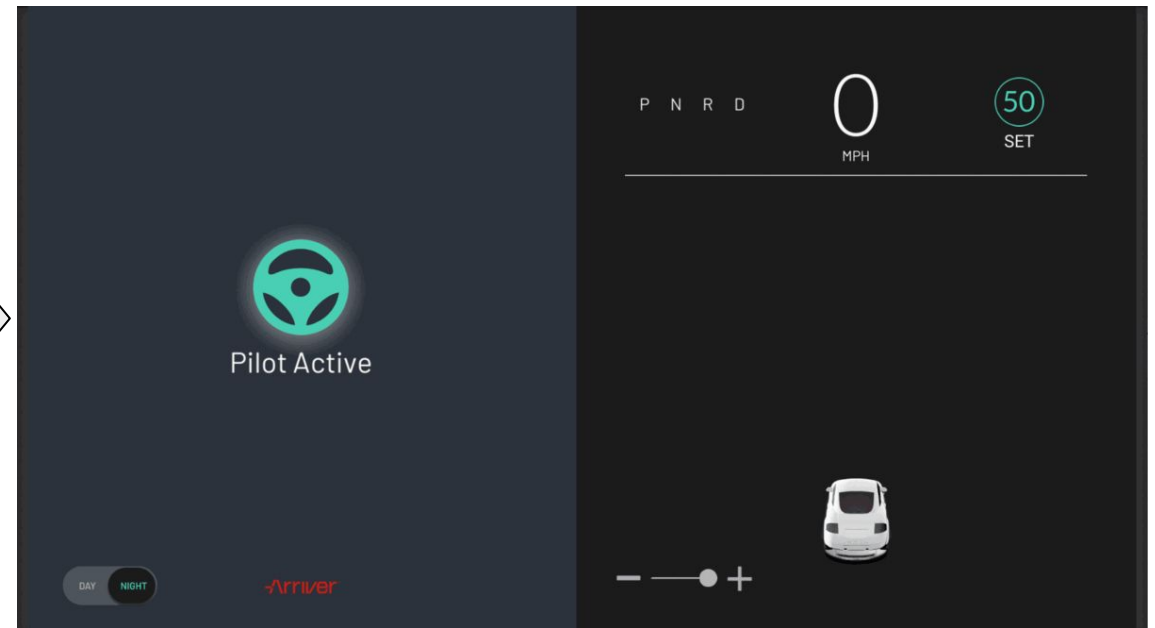
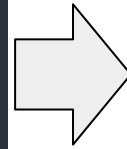


Our Modified HMI

Vision Loss Setting Progress

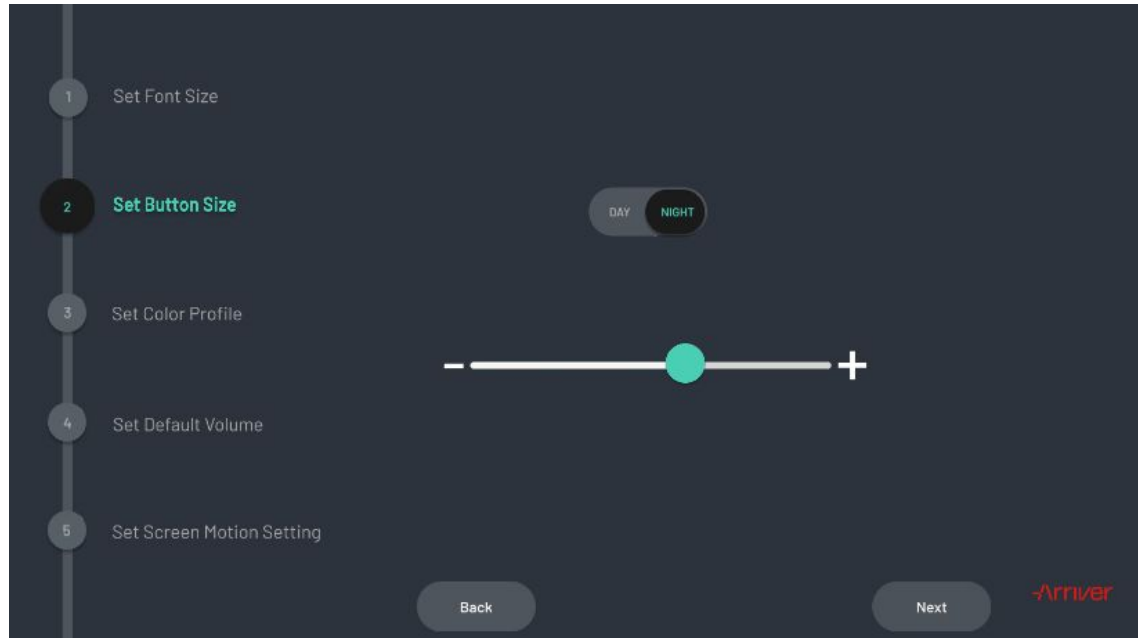


Accessibility Setting

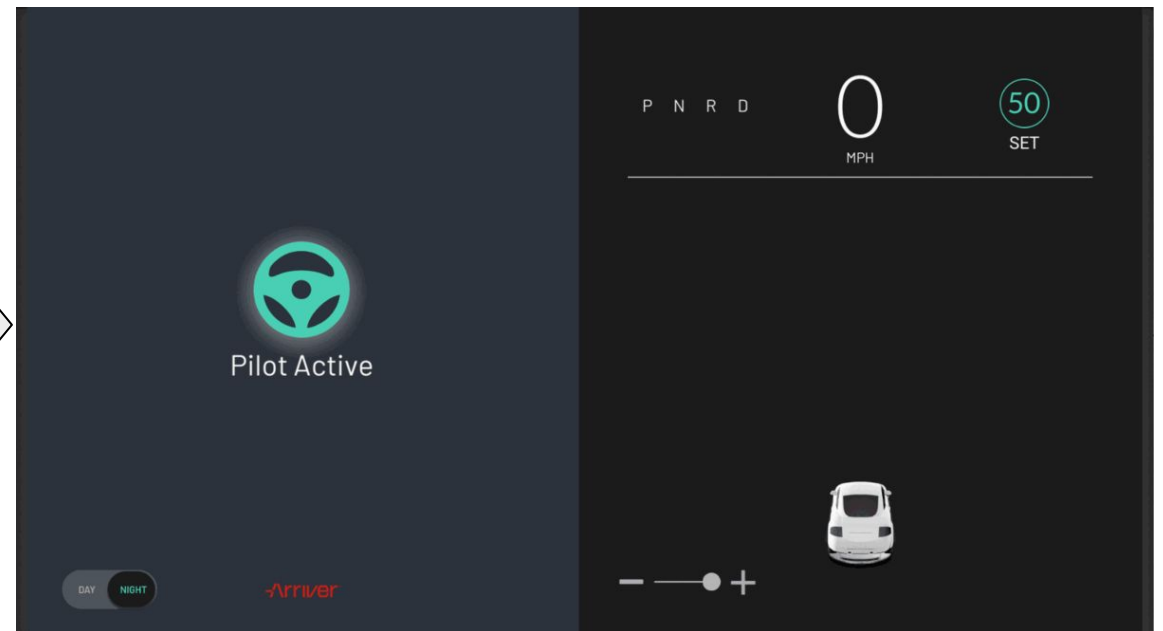
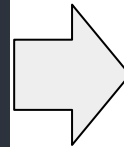


Interface Change

Mobility Issues Setting Progress

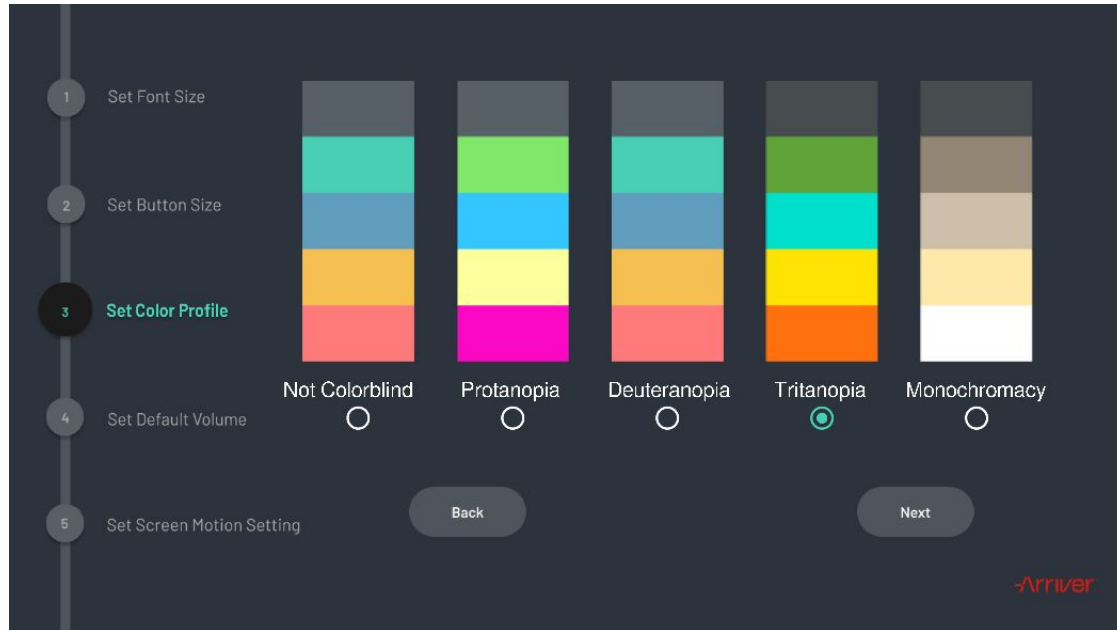


Accessibility Setting

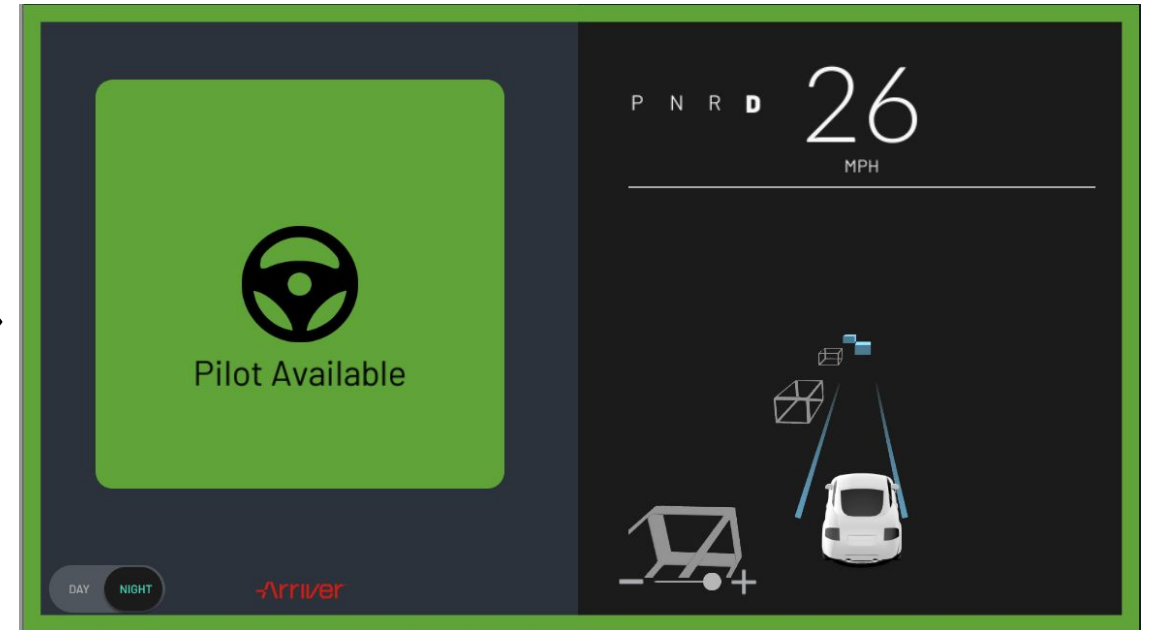
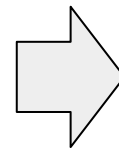


Interface Change

Color Blindness Setting Progress

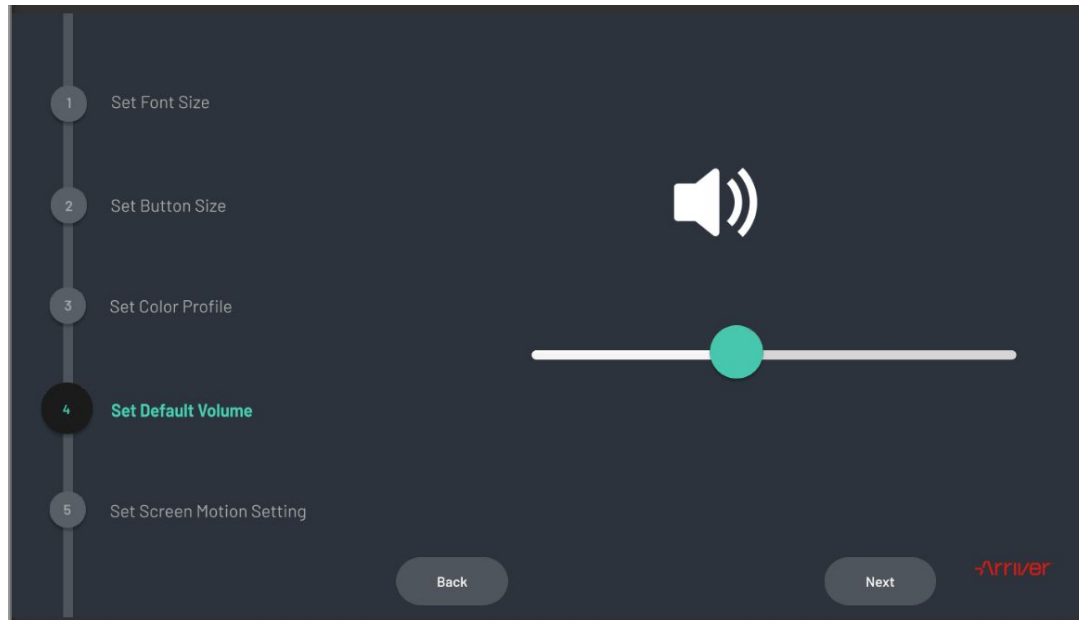


Accessibility Setting

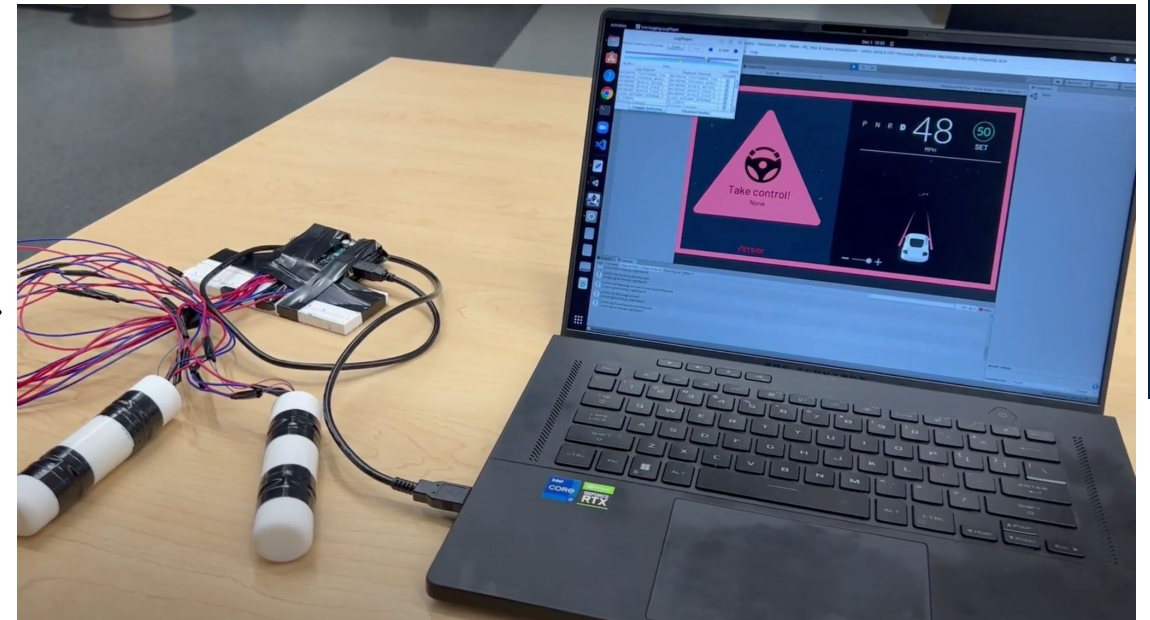
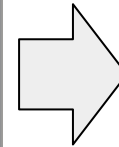


Interface Change

Hearing Loss Setting Progress

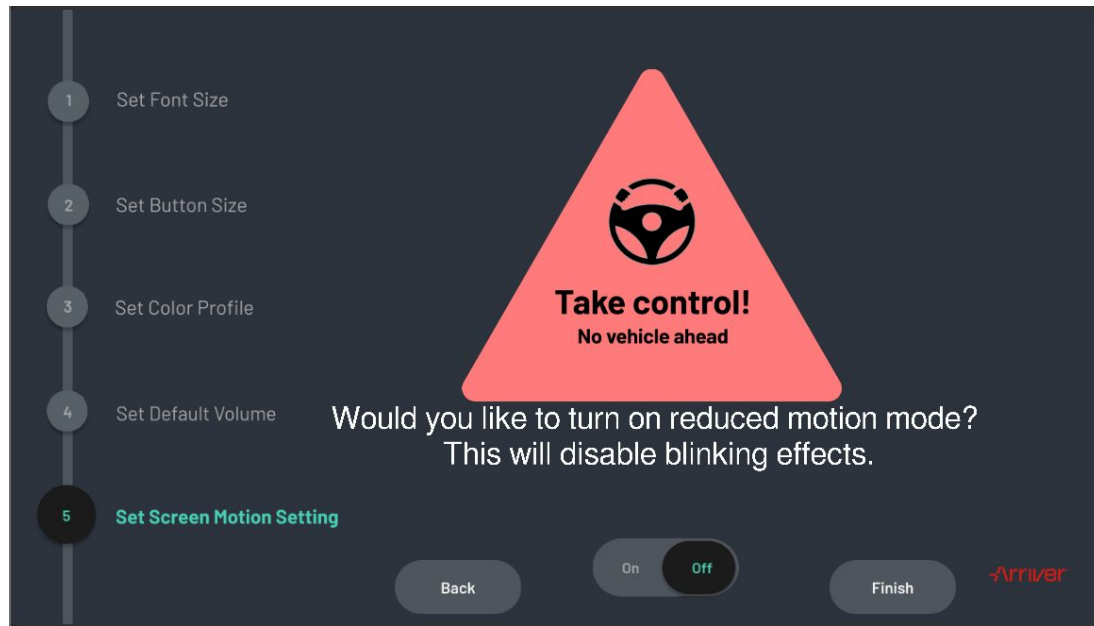


Accessibility Setting

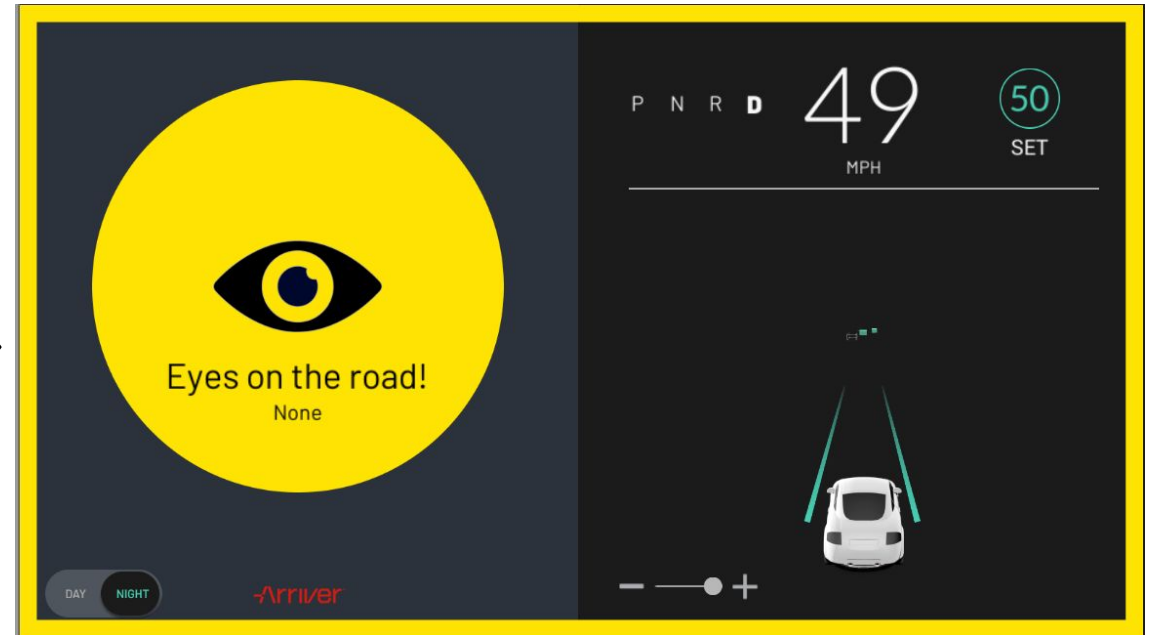
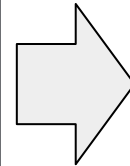


Interface Change

Motion Sensitivity Setting Progress



Accessibility Setting



Interface Change

HMI DEMO

Recommendations

- Further validation with user testing
 - Overall usefulness and usability for the target user groups
 - Layout of the HMI: does it work well? Do people need customization on the left and right panels
 - Setting pages: start from the $\frac{3}{4}$ of the bar? Or the maximum?
- Features requiring further development
 - Profile saving
 - Real-time animation
 - Voice commands for enhanced mobility
 - More layout customization (e.g. ability to swap left and right panels)

Reflection

- New technical skills
 - Unity, LCM, C#, Arduino/Unity communication with Ardity
- Communication skills
 - Effective communication amongst the team
 - Scoping out project with our sponsors
- Dealing with ambiguity



lcm-proj/lcm

Lightweight Communications and Marshalling



Acknowledgments



Rosemary Chen

Graduate Student
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Engineering



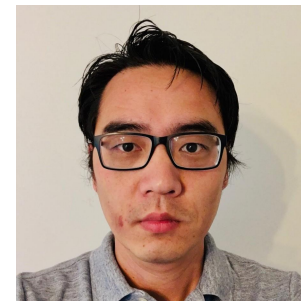
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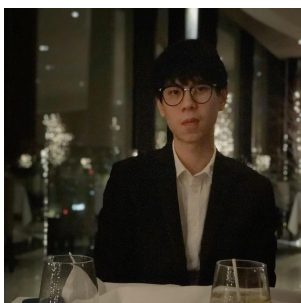
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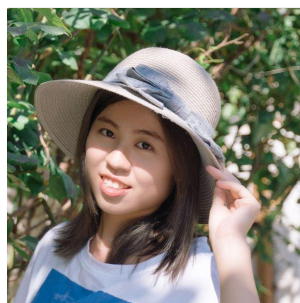
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School of Information

Student Team

Mentors

THANK YOU!



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