

User experience assessment with high level autonomous car console prototype



Hatice Kirkici Gonçalves

id10251@uminho.pt

Supervisor(s): Paula Carneiro¹, Ana Colim²

1. Algoritmi centre / University of Minho

2. Dtx Colab and Algoritmi centre / University of Minho



MIT Portugal 2023 Annual Conference

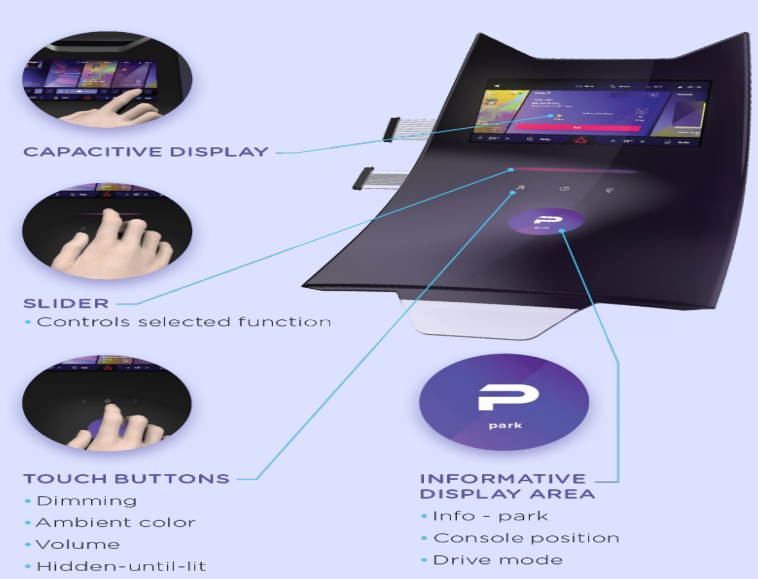
I. Background

- To become accepted, autonomous cars (AC) have to be **perceived as useful, as well as safe and competent.**
- The interior of modern and future cars will **feature increasingly flat and seamless surfaces.**
- By incorporating **ergonomic design principles** that prioritize lightweight materials, and aerodynamic shapes, in AC, energy consumption can be reduced, contributing to **the overall sustainability of transportation systems.**

III. Methods and Materials

- The interaction with the console was performed in a **laboratory context** and the experimental procedure took **less than 10 minutes per participant.**
- First, the participants tested **the different trials with the AC console for 3 minutes** with the help of the main researcher.
- Following that they answered **15 items questionnaire** that also includes **System Usability Scale (SUS)** (Brooke, 2020).

L-console buttons



Console control buttons



II. Objective

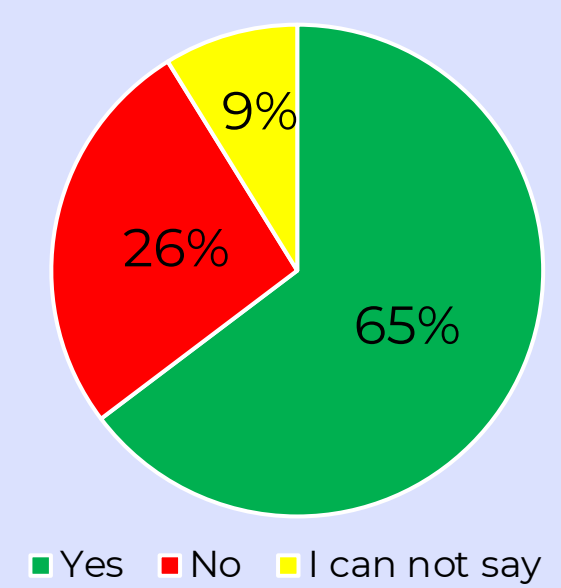
- This study aims to assess the **user experience with the prototype of the autonomous car console.**
- The primary objective is to gather valuable insights into **the usability, efficiency, and overall user satisfaction** with the autonomous car console prototype.

IV. Results and Discussion

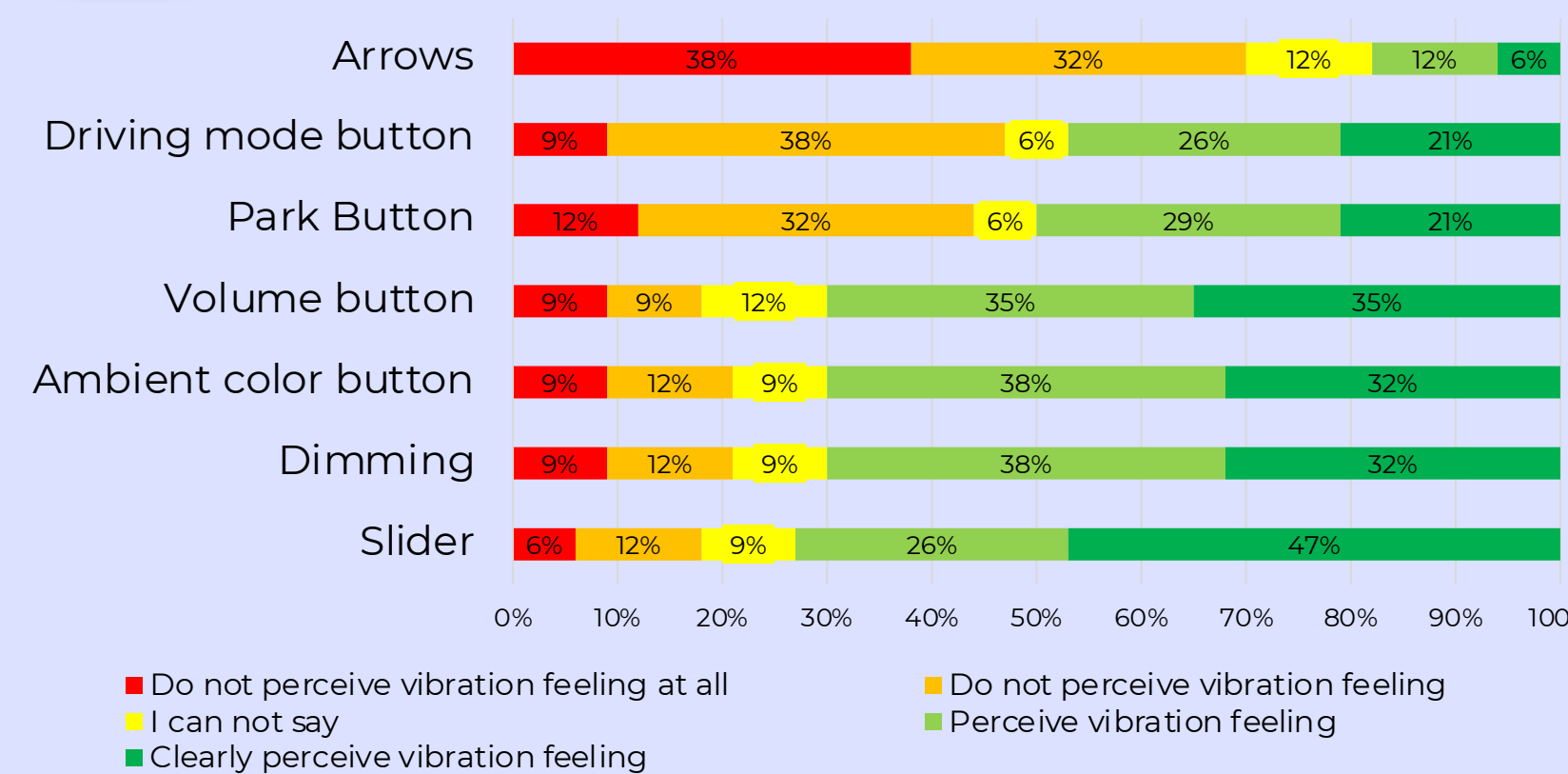


Familiarity with autonomous car concept

Most of the participants (**64.7%**) are familiar with **Level 3 and Level 4** autonomous car concept.



Haptic feedback feeling



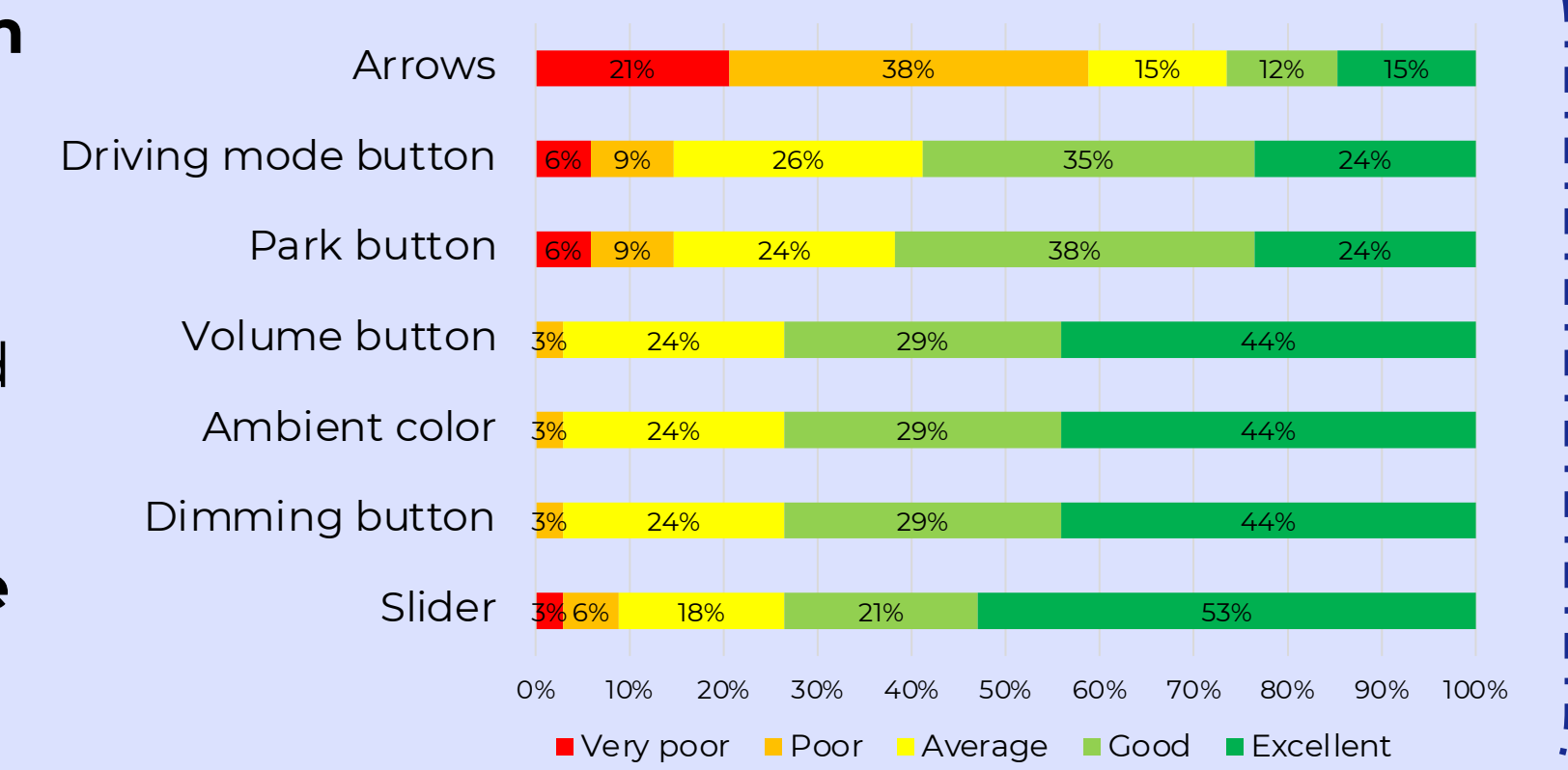
- Participants have **the most difficulty perceiving the arrows' haptic feedback** vibration, followed by the driving mode button and park button.
- L-console buttons** (slider, dimming, ambient color, volume) **were better perceived.**

- L-console buttons **had better capacitive touch feeling evaluation.**

- Arrows had worse capacitive touch feeling** evaluation compared with the park button and driving mode button.

- As evidenced by previous studies **arrows were the buttons that need future improvement.**

Capacitive touch feeling



V. Conclusion

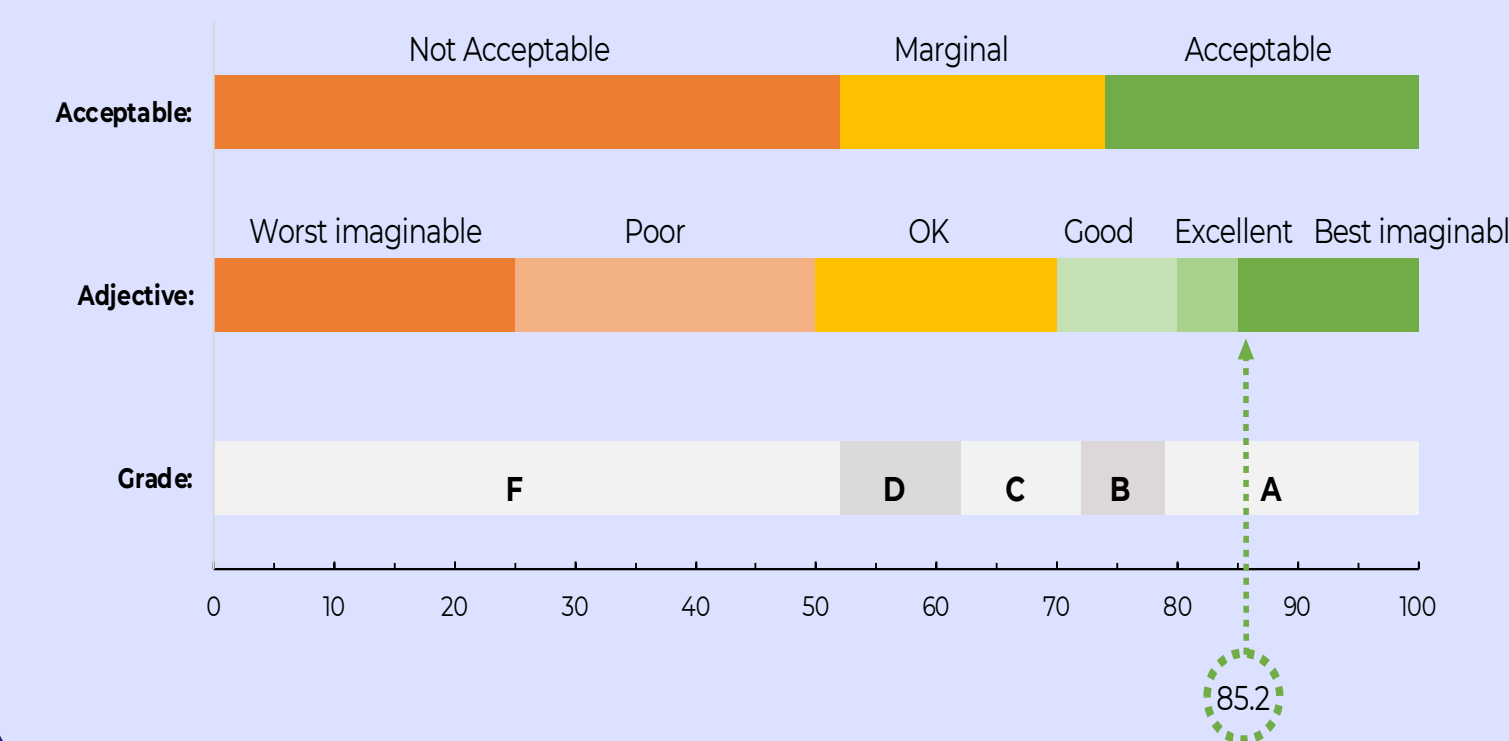
Haptic feedback results showed **better perceptions compared with capacitive touch feeling.**

Overall results showed that **the usability of the autonomous console is already in the acceptable** range.

Future studies could be focused on the **cognitive demand** associated with autonomous console functions /buttons.

- The final SUS value was 85.2** thus console prototype was acceptable with an **excellent adjective rating.**

- A positive trend is particularly evident** in comparison with the values of other evaluated innovations (Bangor et al., 2009; Harvey et al., 2011).



V. References

- Bangor, A., Kortum, P., & Miller, J. (2009). <https://doi.org/10.1080/10447310802205776>
- Glohr, T., Wahn, N., Fritz, M., & Maier, T. (2015). <https://doi.org/10.1016/j.promfg.2015.07.721>
- Hecht, T., Weng, S., Kick, L. F., & Bengler, K. (2022). <https://doi.org/10.1016/j.apergo.2022.103762>
- Harvey, C., Stanton, N. A., Pickering, C. A., McDonald, M., & Zheng, P. (2011). <https://doi.org/10.1016/j.apergo.2010.09.013>

Funded by:



This work also received support from R&D Unit Project Scope UIDB/00319/2020, and DTx CoLAB under the Missão Interface of the Recovery and Resilience Plan, integrated in the notice 01/C05-i02/2022.

under the Doctoral Grant PRT/BD/152835/2021 | Sustainable Cities