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| Formulário de Proposta de Projeto/Estágio | | |
| **Ano 2021/2022, Licenciatura em Engenharia Informática / CEE / Universidade da Madeira** | | |
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| Informação sobre o(s) Orientador(es) | | |
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| Título do Projeto: Comparison of different methods of interaction with in-vehicle infotainment system | | |
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| Informática/Estágio |
| Área Científica  Motivação   |  | | --- | | In car devices are growing both in complexity and capacity, integrating functionalities that used to be divided among other controls [1], one of the most popular examples of this observation is the Tesla manufacturer which integrated all but for the steering, turn indicators, and break and accelerate commands In the infotainment systems.  The complexity of such systems can generate an extra cognitive load, which could cause distractions from the main driving task. Consequentially researchers have studied safety implications of such systems[2] .  Researchers have addressed this issue with different approaches, which share the same common goal, reducing driver distraction. These approaches include for example, haptic feedback in the infotainment screen[3], speech input [4], haptic feedback in the steering wheel, haptic input in the steering wheel [5], bespoke gestures [6], [7] or predictive interfaces which guess the desired input and make it easier for the driver[8]. Other researchers have studied the feedback itself, how to better organize the information and controls to reduce the cognitive load and therefore potential distractions [9].  Studies in these field are normally developed in real-vehicles with custom hardware installed (e.g.[8]), or in simulated scenarios using computer screens or virtual reality headsets (e.g.[5]). These case studies normally use, time to accomplish a certain task, amount of errors during a task, or gaze analysis to evaluate the effectiveness of the proposed interaction approaches.  In this thesis we aim at evaluating 4 different approaches of the interaction with infotainment systems:   * Normal interaction with the touchscreen * Normal interaction with the touchscreen using haptic feedback on the screen * Normal interaction with the touchscreen using the HapWheel system [10] * Voice commands   [1] R. Bishop, *Intelligent Vehicle Technology and Trends*. Artech House, 2005.  [2] “(18) (PDF) The Impact of Driver Inattention on Near-Crash/Crash Risk: An Analysis Using the 100-Car Naturalistic Driving Study Data,” *ResearchGate*. [Online]. Available: https://www.researchgate.net/publication/242182089\_The\_Impact\_of\_Driver\_Inattention\_on\_Near-CrashCrash\_Risk\_An\_Analysis\_Using\_the\_100-Car\_Naturalistic\_Driving\_Study\_Data. [Accessed: 14-Jun-2019].  [3] M. J. Pitts, G. Burnett, L. Skrypchuk, T. Wellings, A. Attridge, and M. A. Williams, “Visual–haptic feedback interaction in automotive touchscreens,” *Displays*, vol. 33, no. 1, pp. 7–16, Jan. 2012.  [4] N. Hataoka, Manabu Araki, Takashi Matsuda, Masayuki Takahashi, Ryoichi Ohtaki, and Y. Obuchi, “Evaluation of interface and in-car speech - many undesirable utterances and sever noisy speech on car navigation application -,” in *2008 IEEE 10th Workshop on Multimedia Signal Processing*, 2008, pp. 956–959.  [5] I. E. González, J. O. Wobbrock, D. H. Chau, A. Faulring, and B. A. Myers, “Eyes on the Road, Hands on the Wheel: Thumb-based Interaction Techniques for Input on Steering Wheels,” in *Proceedings of Graphics Interface 2007*, New York, NY, USA, 2007, pp. 95–102.  [6] I. Aslan, A. Krischkowsky, A. Meschtscherjakov, M. Wuchse, and M. Tscheligi, “A Leap for Touch: Proximity Sensitive Touch Targets in Cars,” in *Proceedings of the 7th International Conference on Automotive User Interfaces and Interactive Vehicular Applications*, New York, NY, USA, 2015, pp. 39–46.  [7] “2016 BMW 7 Series Gesture Control | Pictures, Video, News,” *Digital Trends*, 31-Aug-2015. [Online]. Available: https://www.digitaltrends.com/cars/2016-bmw-7-series-gesture-control-pictures-video-news/. [Accessed: 16-Jun-2019].  [8] B. I. Ahmad, P. M. Langdon, S. J. Godsill, R. Donkor, R. Wilde, and L. Skrypchuk, “You Do Not Have to Touch to Select: A Study on Predictive In-car Touchscreen with Mid-air Selection,” in *Proceedings of the 8th International Conference on Automotive User Interfaces and Interactive Vehicular Applications*, New York, NY, USA, 2016, pp. 113–120.  [9] “TouchCuts and TouchZoom: enhanced target selection for touch displays using finger proximity sensing - Semantic Scholar.” [Online]. Available: https://www.semanticscholar.org/paper/TouchCuts-and-TouchZoom%3A-enhanced-target-selection-Yang-Grossman/2412af6874bf6814d3f31fb6b8885be4fcdca557. [Accessed: 14-Jun-2019]. |   Objetivos   |  | | --- | | The selected student will join the team and it expected that student will assist in:   * Development of mock infotainment system * Development of physical interaction technique with the infotainment system |   Recursos   |  | | --- | |  |   Preencher no caso de o projeto ser desenvolvido numa Entidade Exterior:   |  |  |  | | --- | --- | --- | |  |  | ([       ]) | | Nome da Entidade |  | Contacto Telefónico | |  |  |  | | Morada |  | E-mail |   Observações e/ou Pré-Requisitos   |  | | --- | |  | |