|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Ficha de Proposta de Dissertação/ Projeto/Estágio Mestrado | | | | |
| **Ano Letivo 2019/2020, Mestrado em Engenharia Informática, FCEE / Universidade da Madeira** | | | | |
|  |  |  | | |
| Informação sobre o(s) Orientador(es) | | | | |
|  | | | | |
| Interaction with in car infotainment system, implementation and evaluation of haptic an hover techniques | | | | |
| Título do Projeto | | | | |
| Filipe Magno Gouveia Quintal | | |  | (967549595) |
| Nome do Professor Orientador | | |  | Contacto Telefónico |
|  | | |  | filipe.quintal@staff.uma.pt |
| URL do Projeto | | |  | E-Mail |

Preencher no caso de existir um Co-Orientador ou Orientador Externo:

|  |  |  |
| --- | --- | --- |
|  |  | () |
| Nome |  | Contacto Telefónico |
|  |  |  |
| Departamento ou Empresa |  | E-Mail |

Preencher no caso de ser uma dissertação proposta pelo aluno:

|  |  |  |
| --- | --- | --- |
|  |  |  |
| Nome |  | Nº de Aluno |

|  |
| --- |
| Informação sobre a Dissertação/Projeto/Estágio |

|  |
| --- |
| Informatics Engineering, Human Computer Interaction |
| Área(s) Científica(s)  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 the combination of 2 of the state-of-the-art interaction techniques for vehicle infotainment systems, using haptic feedback in the steering wheel together with hoover pointing selection. This proposed interaction technique will also be evaluated against traditional touchscreen control present in vehicles infotainment system.  [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   |  | | --- | | During the period of the proposed thesis students are expected to:   * Develop a literature review starting from the work referenced in the motivation of this proposal * Perform a desk-research of in-car infotainment systems and identify the biggest common practices between manufacturers * Study the most common tasks performed in these systems (e.g. radio, navigation) * Implement a mockup car cockpit for the evaluation * Implement a mockup infotainment system to be deployed in an android tablet. * Implement a hover point detection using android OS available libraries * Implement a haptic feedback in a mockup steering wheel using a micro-processor and haptic hardware of choice * Study an appropriate vocabulary to be used in the feedback * Integrate both the haptic feedback with the simulated infotainment system * Design a comparative study with “traditional” infotainment systems against haptic and hover pointing interaction * Perform the evaluation. |   Recursos   |  | | --- | | The student will be provided with all the required resources for this Project:   * Android tablet * Microprocessors * Prototyping tools * Access to literature libraries |   Preencher no caso de o projeto ser desenvolvido numa Entidade Exterior:   |  |  |  | | --- | --- | --- | |  |  | () | | Nome da Entidade |  | Contacto Telefónico | |  |  |  | | Morada |  | E-Mail |   Observações e/ou Pré-Requisitos   |  | | --- | |  | |