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| **Ano Letivo 2019/2020, Mestrado em Engenharia Informática, FCEE / Universidade da Madeira** | | | | |
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| Interaction with ECUs with the aim of making driving safer and more efficient | | | | |
| Título do Projeto | | | | |
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| Informatics Engineering, Autonomous Driving, Electronic Engineering |
| Área(s) Científica(s)  Motivação   |  | | --- | | Nowadays cars are comprised of several control systems, ranging from the basic ECU which controls the engine and its operation to the different modules, responsible for controlling components such as driver’s information, sensors, comfort among others [1]. Furthermore, most drivers possess smartphones which also contain a series of sensors like an accelerometer, GPS or camera that could be used to infer the driving conditions.  The motivation for the thesis aims at combining both observations stated before in a hub like system which will advice the driver in several areas regarding his/hers driving and vehicle. As a proof of concept, we will use an android smartphone which is a highly connected device and will allow us to interact with the car using a Bluetooth adapter, and also connect with other services through Wifi. In this way we can make older cars with newer car features that will improve the relationship between the driver and the car.  In summary, the proposed system, aims at contributing in three interconnected fields:  Safety: By using the smartphone sensor to assess variables such as speed, location, or reading traffic signs. Furthermore, the smartphone camera can also be used to infer the driving attention when driving. This data can be combined with vehicle information, such as throttle position or speed to provide a more accurate representation of the drivers attention [2] [5] [7].  Studies have shown that the lack of attention or disrespect for the traffic rules are two of the biggest causes for accidents, and this way we aim at using an everyday device to address this issue [6].  Driver control: Although vehicles are getting more computerized as ever, some of that data is still hidden for the driver. [1] Often the driver needs to pay specialized labor to read faulty codes, or even to unluck features that were originally fitted to the car. By interacting with the car, the proposed system aims at reverse engineering [3] some of these codes [4]. This data can be used for the driver to make better decisions regarding the driving behavior and maintenance of the vehicle.  Maintenance: All the sensor described above can also be used to recommend preventive maintenance to the driver, by reading data from sensors such as temperature of the different components, or even fautly codes, the system can then advice the driver to perform preventive maintenance, which can result in a cheaper operation. Timely maintenance can also result in lower fuel consumption which relates to lower emissions, which is one of the biggest issues humankind is facing.  [1] R. Bishop, *Intelligent Vehicle Technology and Trends*. Artech House, 2005.  [2] Jin-Hyuk Hong, Ben Margines, and Anind K. Dey. 2014. 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The car data toolkit: smartphone supported automotive HCI research. In Proceedings of the 5th International Conference on Automotive User Interfaces and Interactive Vehicular Applications (AutomotiveUI ’13). Association for Computing Machinery, New York, NY, USA, 168–175. DOI:https://doi.org/10.1145/2516540.2516550 |   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 * Develop a research on how the ECUs works and who we can connect with them to obtain data * Study the bests ways to alert the driver * Interact with the car ECU and other sensors and cameras * Use of face detection libraries * Use of GPS and other Android features * Implement an Android App that use the ECU data and use sensors and cameras to improve driving * Study an appropriate way to give feedback to the driver * Perform the evaluation. |   Recursos   |  | | --- | | The student will be provided with all the required resources for this Project:   * ECU * OBD plug * Android phone * Sensors, cameras * 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   |  | | --- | |  | |