

## Vehicles Analysis, Assessment and Redesign Related to Ergonomics and Human Factors

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**Abstract :** Every day, the roads are scenery of numerous accidents involving vehicles, producing thousands of deaths and serious injuries all over the world. Investigations have revealed that Human Factors (HF) are one of the main causes of road accidents in modern societies. Distracted driving (including external or internal aspects of the vehicle), which is considered as a human factor, is a serious and emergent risk to road safety. Consequently, a further analysis regarding this issue is essential due to its transcendence on today's society. The objectives of this investigation are the detection and assessment of the HF in order to provide solutions (including a better vehicle design), which might mitigate road accidents. The methodology of the project is divided in different phases. First, a statistical analysis of public databases is provided between Spain and The UK. Second, data is classified in order to analyse the major causes involved in road accidents. Third, a simulation between different paths and vehicles is presented. The causes related to the HF are assessed by Failure Mode and Effects Analysis (FMEA). Fourth, different car models are evaluated using the Rapid Upper Body Assessment (RULA). Additionally, the JACK SIEMENS PLM tool is used with the intention of evaluating the Human Factor causes and providing the redesign of the vehicles. Finally, improvements in the car design are proposed with the intention of reducing the implication of HF in traffic accidents. The results from the statistical analysis, the simulations and the evaluations confirm that accidents are an important issue in today's society, especially the accidents caused by HF resembling distractions. The results explore the reduction of external and internal HF through the global analysis risk of vehicle accidents. Moreover, the evaluation of the different car models using RULA method and the JACK SIEMENS PLM prove the importance of having a good regulation of the driver's seat in order to avoid harmful postures and therefore distractions. For this reason, a car redesign is proposed for the driver to acquire the optimum position and consequently reducing the human factors in road accidents.

**Keywords :** analysis vehicles, assesment, ergonomics, car redesign

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