Brief presentation of my research work on pedestrian behavior and road safety

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During my doctoral studies, I focused my research on pedestrian safety and microsimulation. The aim of the research was to gain a good understanding of pedestrian crossing action at unsignalized crosswalks set on roundabout's entry leg, by analyzing two influential time periods, i.e. reaction time tr and crossing time tc, which together describe the whole action under study, and to critically define whether the recalled action can be reliably studied by simulating it via a professional microsimulation software. The main objective of the research was defined by the hypothesis " the mathematical model "Social Force Model", which aims at reproducing the realistic behavior of pedestrians and their interaction with motorized traffic, can be calibrated by applying a calibration methodology that uses neural networks as a prediction tool". In addition, some activities have been developed to allow a complete understanding of the mentioned topic: firstly, an overview of the covered themes (safety studies, calibration methods and neural networks applied to transportation issues) was produced; secondly, pedestrian behavior and safety on a zebra crossing located on the entry leg of a roundabout was analysed by mean of real world recorded video footages and the elaboration of walking trajectories; the influence of the input parameters of the model on the simulation of pedestrian behavior was studied; a practical procedure for calibrating the pedestrian Social Force Model, as implemented in Vissim/Viswalk and related to the specifically chosen road location, was developed using neural networks; the calibrated model was validated by applying new real-world data measured both at the same and at a new location with similar characteristics to determine the functioning of the calibration procedure and the accuracy and reliability of the model results; the results of the calibrated and validated pedestrian model were analyzed by applying statistical tests (Bonett and Levene tests,...); in addition, a neural network was developed, which can predict the reaction time of pedestrians measured using eye-tracking technology. Finally, surrogate safety measures for pedestrian-vehicle interactions were calculated based on the results of the microsimulation model.

In the next period, I would like to propose a postdoctoral research project that will deepen the research started in the PhD by applying some of the methods used in the PhD thesis to **pedestrians with disabilities**. The overall aim of the postdoctoral project would be to describe *the pedestrian behaviour of people with disabilities in road traffic and to develop a prediction model for their crossing behaviour.*

Based on the above experiences, three behavioural parameters are considered descriptive of the crossing behaviour: **crossing time, crossing speed and reaction time**. In order to achieve the overall objective of the project, various follow-up objectives should be covered, which can be summarised as follows:

1) Characterization of the safety issues perceived by people with various disabilities when walking as pedestrians on the road infrastructure;
2) Determination of the reaction time of people with different disabilities under ideal conditions;
3) Characterisation of the the safety problems encountered by people with different disabilities when walking as pedestrians on the road infrastructure by objectively measuring their attention allocation;
4) Definition the crossing behaviour of people with different disabilities in terms of crossing time, crossing speed and reaction time under real conditions at different intersections.
5) Development of a prediction model for the crossing behaviour of pedestrians with different disabilities.