Bicycles in urban areas: Review of existing methods for modeling behavior

As the number of bicyclists in urban areas continues to increase, the need to realistically model the movement and interactions of bicyclists is rapidly gaining importance in the accurate modeling of mixed urban traffic. In response to this need, several approaches to modeling bicyclists’ movements and interactions have been developed. This study summarized selected modeling approaches that depict the state of the art in bicycle modeling. The overall modeling of bicycles was divided into modeling of uninfluenced operational and tactical behavior and influenced operational and tactical behavior. The ability to model bicyclist behavior on each of these levels was evaluated on the basis of the results of an extensive literature review and input from an expert workshop that included industry professionals and academics with extensive experience in traffic modeling. The results of the assessment indicate that although the approaches used to model uninfluenced and influenced behavior on the operational level vary in their level of detail and ability to reproduce reality correctly, it is possible to model most bicyclist behavior at this level. There is a
need to validate and calibrate these models with empirical data collected from a variety of locations and traffic situations. The state of the art in modeling the tactical behavior of bicyclists is, however, less developed. It is important to model the uninfluenced and influenced tactical behavior of bicyclists accurately because bicycle behavior is less constrained by road markings and traffic regulations.

Kongress- / Buchtitel:
Transportation Research Record: Journal of the Transportation Research Board

Jahr:
2014

Occurences:
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