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Editorial

Modern Roundabouts: A Challenge of the Future

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Throughout the world, research into the various aspects and types of roundabouts has spanned many decades. During this long period the number of vehicles, their sizes, and performance characteristics, including speeds, have radically changed. Similar changes are also noted for the drivers' experiences. These changes have had a strong influence on the evolution of modern roundabouts. The primary aspects of the layout of modern roundabouts in relation to capacity and traffic safety are now known.

However, there are still areas that merit further evaluation and research and they are addressed as part of the aims and the scope of this special issue.

The paper by K. Shaaban and H. Hamad presents a method to analyze driver behavior and estimate the critical gap for three-lane roundabouts. The operations of multilane roundabouts, especially three-lane roundabouts, are unique and more complicated than any other type of roundabouts. Analysis showed that the vast majority of the vehicles accept the gap in groups and the critical gap was estimated accordingly. The study provides a new explanation for the operation at multilane roundabouts.

The paper by R. Lattarulo et al. developed a complete framework of motion planning for automated vehicles while considering different constraints with parametric curves for lateral and longitudinal planners. Parametric Bézier curves are used as the core approach for trajectory design in intersections, roundabouts, and lane change maneuvers. Additionally, a speed planner algorithm is presented using the same parametric curve approach, considering comfort and safety. The planning method was tested in simulation conditions and with the real platform in automated mode and showed good results.

The paper by O. Giuffrè et al. presented a microsimulation-based approach for roundabout safety performance evaluation and developed a crash prediction model from simulated peak hour conflicts. A generalized linear model framework was used to estimate the prediction model based on field collected crash data for 26 roundabouts. The crash prediction model was based on the assumption that the crashes per year are a function of peak hour conflicts, the ratio of peak hour traffic volume to average daily traffic volume, and the roundabout outer diameter.

The paper by D. Lee et al. investigates gap acceptance behaviors at roundabouts based on field observations during both good weather and rainy conditions. The critical gaps were estimated in 4 conventional roundabouts, and a logit model for gap acceptance using various roundabout variables was developed to investigate gap acceptance maneuvering at roundabouts. Analysis showed that rain conditions influenced the accepted gaps. Drivers need about 10 percent longer gap entry into roundabouts during rainy conditions, and gap acceptance probabilities are 10 to 20 percent lower for the same given gap time during rainy conditions compared to good weather conditions.

The paper by A. V. Goncharenko investigates theoretically the possible directions of some specified methods for

the alternative roundabouts effectiveness on modeling and optimization. The study provides a prototypic approach used upon the issues related to the support of the alternative roundabouts worthiness (vehicle worthiness, riding worthiness, transportation worthiness, etc.). More in particular, the prototypic approach is adopted from the aircraft airworthiness support measures concepts of developed from subjective analysis on the basis of Jaynes' principle in the framework of the calculus of variations theory.

The paper by G. Tesoriere et al. performed an analysis through a comparison of two nonconventional double-lane roundabout schemes defined as elliptical and turbo to define the safest solution considering direct and surrogate parameters. The comparison of their geometry and technical elements was done by VISSIM microsimulator and SSAM tools, assuming that turbo roundabout due to its physical separating traffic lanes in the central circulatory carriageway will enable potentially better traffic safety conditions. This comparative analysis allows for reducing possible security and economic impacts for the community.

The paper by M. Park et al. presents the analyses of the effects of the geometric and traffic flow conditions on traffic accident frequency at roundabouts. This study was contributed to the understanding of which factors realistically affect traffic accident occurrence and random parameters were applied. This study tried to make up for the weakness of the fixed parameters model, which constrains estimated parameters to be fixed across all observations. A total of eight variables were determined to be the main influencing factors on traffic accident frequency and more safe roundabout design, and more efficient roundabout operations are expected based on this study results.

Conflicts of Interest

The editors declare that they have no conflicts of interest regarding the publication of this special issue.

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