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Abstract

Time-To-Failure Modelling in On-Chip LiDAR Sensors for Automotive Applications †

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In general, when forward-looking on-chip LiDAR is considered, the role of these sensors in vehicle collision avoidance is very important. Therefore, the reliability assessment related to accuracy in obstacle detection from information provided by LiDAR sensors has become a key issue to be researched by the scientific community. The analysis of reliability must be focused on certain critical points such as solution to navigation errors, measurement range error, error in the scanning angle, divergence in the laser, etc. This paper establishes a relationship based on models for obstacle detection and classification in complex traffic scenarios. These models have been generated from data collected, provided by LIDAR sensor models, implemented in a commercial simulation tool such as SCANeR studio. For this, a traffic scenario has been created in this simulation tool. To create models, the proposal combines two widely reported pattern recognition methodologies, including fully flexible Bayesian Networks and k-nearest neighbors algorithm. Subsequently, a comparison is made during a model simulation in a traffic scenario, obtaining very promising results in terms of accuracy based on two merit figures: distance root mean square and mean root square error. Finally, the best results have been reached with k-nearest neighbors algorithm.