Silesian University of Technology
Gliwice

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Politechnika
Śląska

PHD DISSERTATION

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RESEARCH AND DEVELOPMENT OF OCCUPANCY GRID FUSION FOR AUTOMOTIVE APPLICATIONS

SUPERVISOR:

dr hab. inż. Roman Starosolski

INDUSTRIAL SUPERVISOR:

dr hab. inż. Paweł Skruch

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PhD Dissertation Abstract

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This study focuses on researching machine perception methods for automated
driving and advanced driver assistance systems. The developed solution is based on
occupancy grid map generation using sensor data fusion. The research goes through
the state of the art data fusion and inverse sensor methods. In the research, a novel
process for performance assessment of grid-based perception has been presented. The
process is based on the commercial automotive virtual validation tooling, that has been
extended with means for the generation of sensors and reference data. The process
uses generated sensor data to execute prototypes of algorithms as well as the reference
data to accomplish assessment of their performance. Work also covers new architectural
variants by combining the existing methods. The experimental validation has also been
carried out in real-world experiments, utilizing data from real sensors installed on the test
vehicle. Real-world data has been reprocessed in Hardware in The Loop (HIL) system
built for this research purposes. For the selected methods in the assessment, the execution
time has been measured on the prototyping platform