

# INFORMATION SOCIETY TECHNOLOGIES (IST)

## PROGRAMME



### AIDE

#### IST-1-507674-IP

## Driver visual distraction assessment by Enhanced Occlusion Technique (EOT)

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Activity No.	<b>T2.2.2</b>	Activity Title	<b>Occlusion Method Development (Task "Visual Demand Measurement tool development")</b>
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## EXECUTIVE SUMMARY

This report presents the results of an experiment conducted at BAST, which was designed to examine the suitability of the Enhanced Occlusion Technique (EOT). BAST's development of EOT was based on the original occlusion technique using occlusion goggles. Both the original occlusion technique and EOT can be used in early stages of HMI development for the evaluation of tasks to operate an in-vehicle information system (IVIS). In comparison with the original occlusion technique, EOT presents a better simulation of real driving task and driver workload. This was achieved by developing a continuous sensomotor tracking task, which the subjects performed additionally to the IVIS task under occlusion conditions. Tracking deviation was fed back to the subjects via acoustic signals.

The basic hypothesis was that the higher workload of EOT conditions leads to an improved sensitivity of metrics presented by the occlusion technique for the assessment of IVIS tasks. To verify this hypothesis laboratory tests using EOT and the original occlusion technique were performed.

Results of this study showed that EOT is a recommendable approach to improve occlusion technique:

- Test conditions of EOT resulted in an improved sensitivity of indicators for IVIS task performance. This finding appeared with total task time TTT, total shutter open time TSOT and occlusion index R. For these indicators the impact of the tracking task resulted in a spreading of values between both IVIS tasks. The occlusion index R, which was used as indicator for interruptability of IVIS task, was significantly sensitive only under EOT conditions, but was not able to differentiate between IVIS tasks under conditions of the original occlusion technique. TTT and TSOT were able to differentiate between the IVIS tasks under both conditions.
- EOT has the potential to provide further indicators, i.e. embedded measures derived from tracking task performance. Indicators for tracking task performance used in this study proved to be sensitive for changes in tracking task difficulty, which means sensitivity for changes of mental workload of driving task. But they were not able to differentiate clearly between IVIS tasks. Further investigations on applicable indicators for tracking task performance are necessary to exploit this potential of EOT.
- As an indicator of mental workload, subjects were asked to estimate their personal effort for task completion by using the Rating Scale Mental Effort (RSME). RSME was able to discriminate between IVIS tasks and tracking tasks, thus confirming the above-mentioned findings on EOT with IVIS task performance.

From the experience of this study EOT appears to need hardly any more effort for test preparation than the original occlusion method does. Furthermore, EOT seems to be applicable to a wide area of different IVIS tasks.

Every evaluation method applied in early stages of the HMI development process will have a crucial effect on decisions of HMI designers. Therefore, one of the open questions is the comparability of EOT results with those of methods commonly used in later stages of the development process, e.g. tests on driving simulator or on-road tests. There is a need for further experiments to study the correlation of results between EOT and these methods.