

# Validation of a new automatic drowsiness quantification system for drivers

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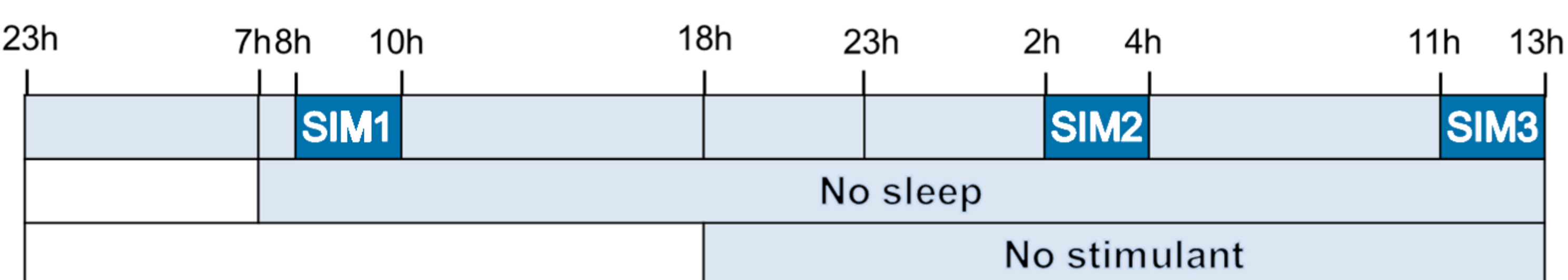
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## Abstract

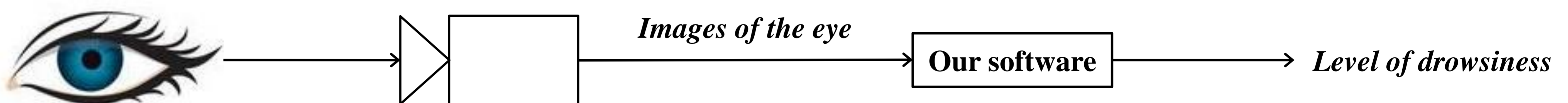
Drowsiness is a major cause of road accidents [1, 2] and oculography seems to be the most sensible approach to reliably and objectively assess drowsiness in practice. We have thus developed a new automatic drowsiness quantification system that uses images of the eye to automatically determine a level of drowsiness, this independently of any task. To prove that this system is useful for preventing driving accidents, we show that this level of drowsiness is well "correlated" with the driving performance, here quantified by the standard deviation of lane position (SDLP).

## EXPERIMENTAL DESIGN AND SETUP

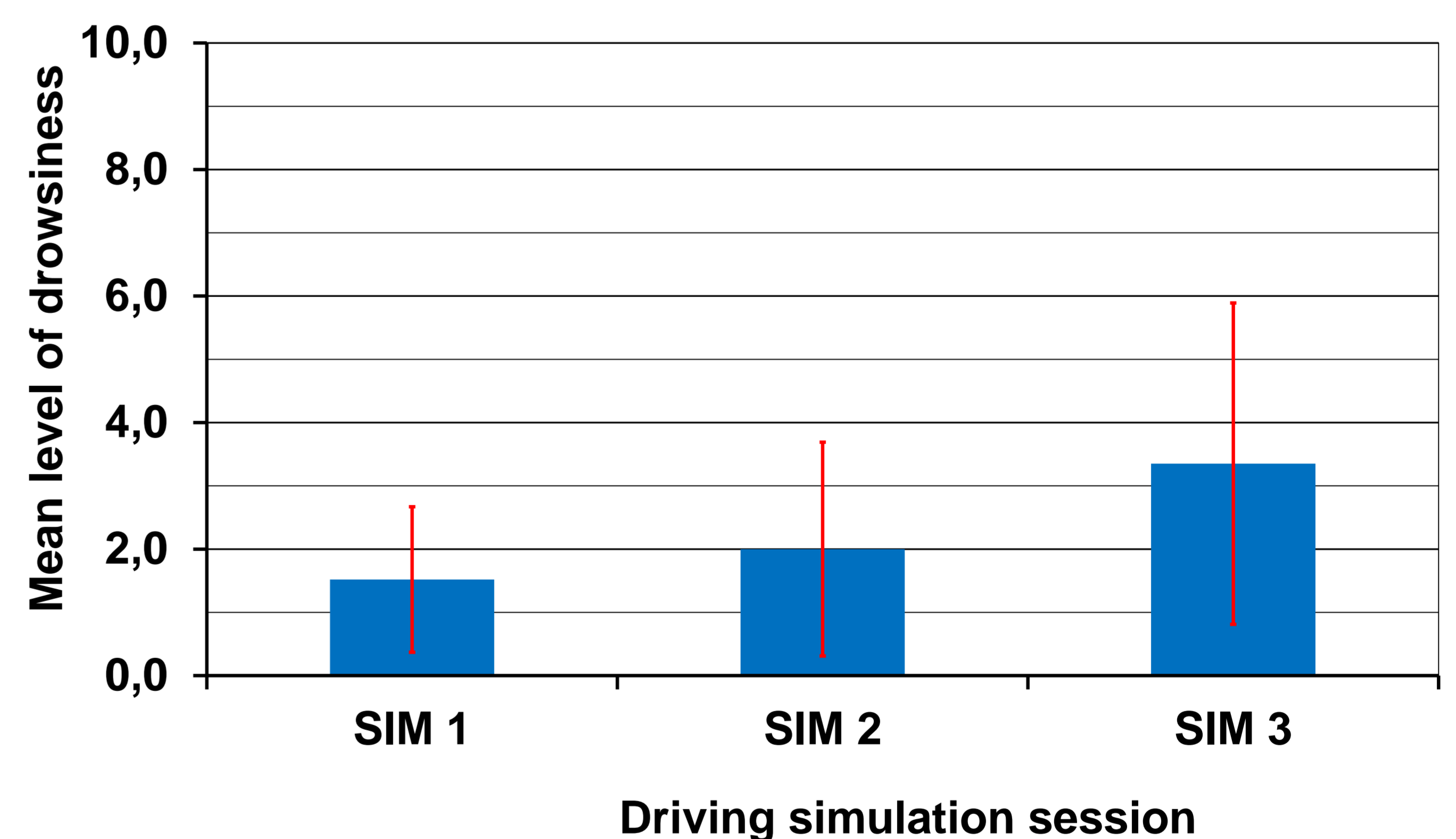
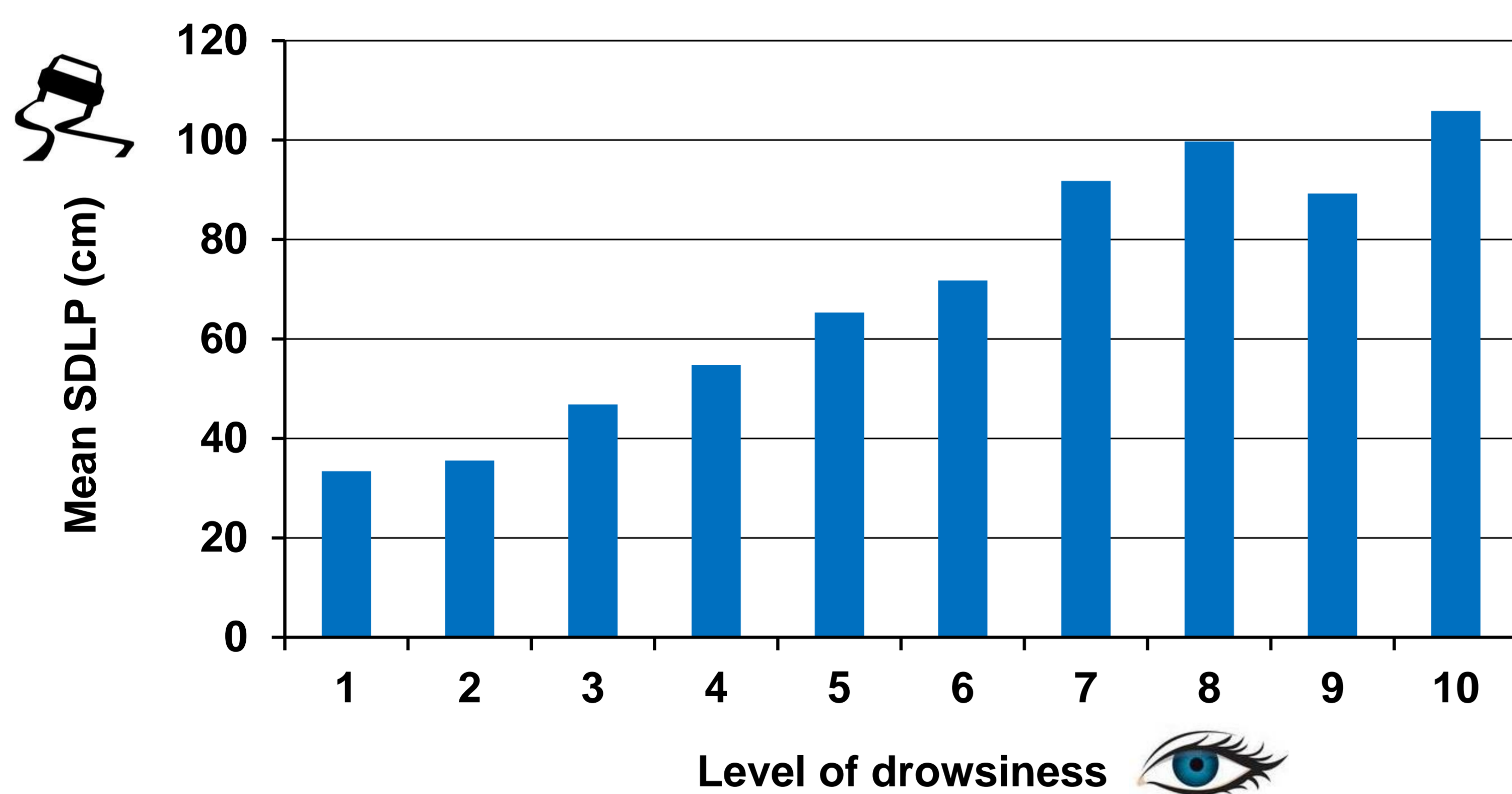
- 14 participants (7 M, 7 F), aged 21-33 years, with mean of 23.7
- 3 sessions in driving simulator (SIM), each of 45 minutes
- Protocol approved by ethics committee



## ARCHITECTURE OF OUR SYSTEM



## RESULTS



## CONCLUSION

We have shown that the level of drowsiness produced by our automatic drowsiness quantification system is significantly "correlated" with the standard deviation of lateral position (SDLP) of a vehicle on the road. Furthermore, our system has the advantage of being (1) noninvasive, (2) usable in any condition (e.g. day and night), (3) automatic (i.e. without any action required from the user). Therefore, our system offers a significant potential for monitoring the performance of a driver in controlling his/her vehicle and thus preventing accidents, this in a practical and ergonomic way.

## ACKNOWLEDGMENTS

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- Driving simulator: IFSTTAR (France)

## REFERENCES

- [1] Klauer, et al., "The impact of driver inattention on nearcrash/crash risk: An analysis using the 100-Car Naturalistic Driving Study data." NHTSA, 2006.
- [2] Association de Sociétés Françaises d'Autoroutes, "Somnolence au volant – Une étude pour mieux comprendre." 2010.