

# Development of an automatic reference system for directly quantifying drowsiness from a few polysomnographic signals

Clémentine FRANCOIS<sup>1</sup>, Murielle KIRKOVE<sup>1</sup>, Jérôme WERTZ<sup>1</sup>, Thomas LANGOHR<sup>1</sup>,  
Robert POIRRIER<sup>2</sup>, Jacques G. VERLY<sup>1</sup>

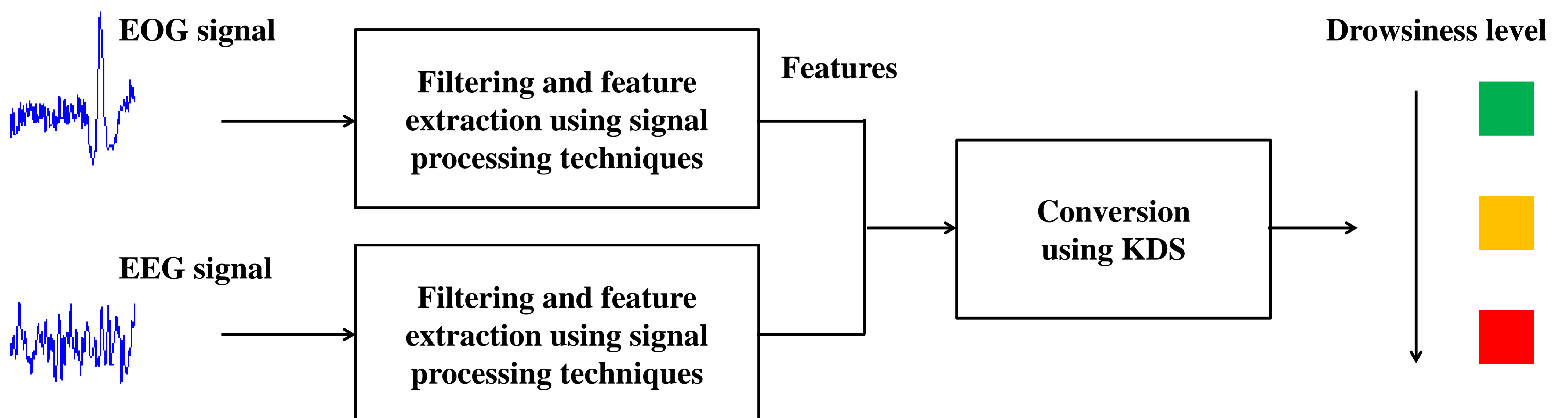
<sup>1</sup>INTELSIG Laboratory, Dept. of Electrical Engineering and Computer Science, University of Liège, Liège, Belgium

<sup>2</sup>CETES, University Hospital of Liège, Liège, Belgium

## INTRODUCTION

Drowsiness is a major cause of various types of accidents. It would be responsible for 1/3 of fatal accidents on highways [1] and for 90,000 car crashes per year in France [2]. Preventing such accidents is highly desirable to save lives and to avoid unnecessary injuries. We are thus developing an innovative, automatic, EEG/EOG-based system for quantifying drowsiness. This system is primarily intended to serve as a “gold standard” reference to validate other drowsiness monitoring systems.

## METHODS

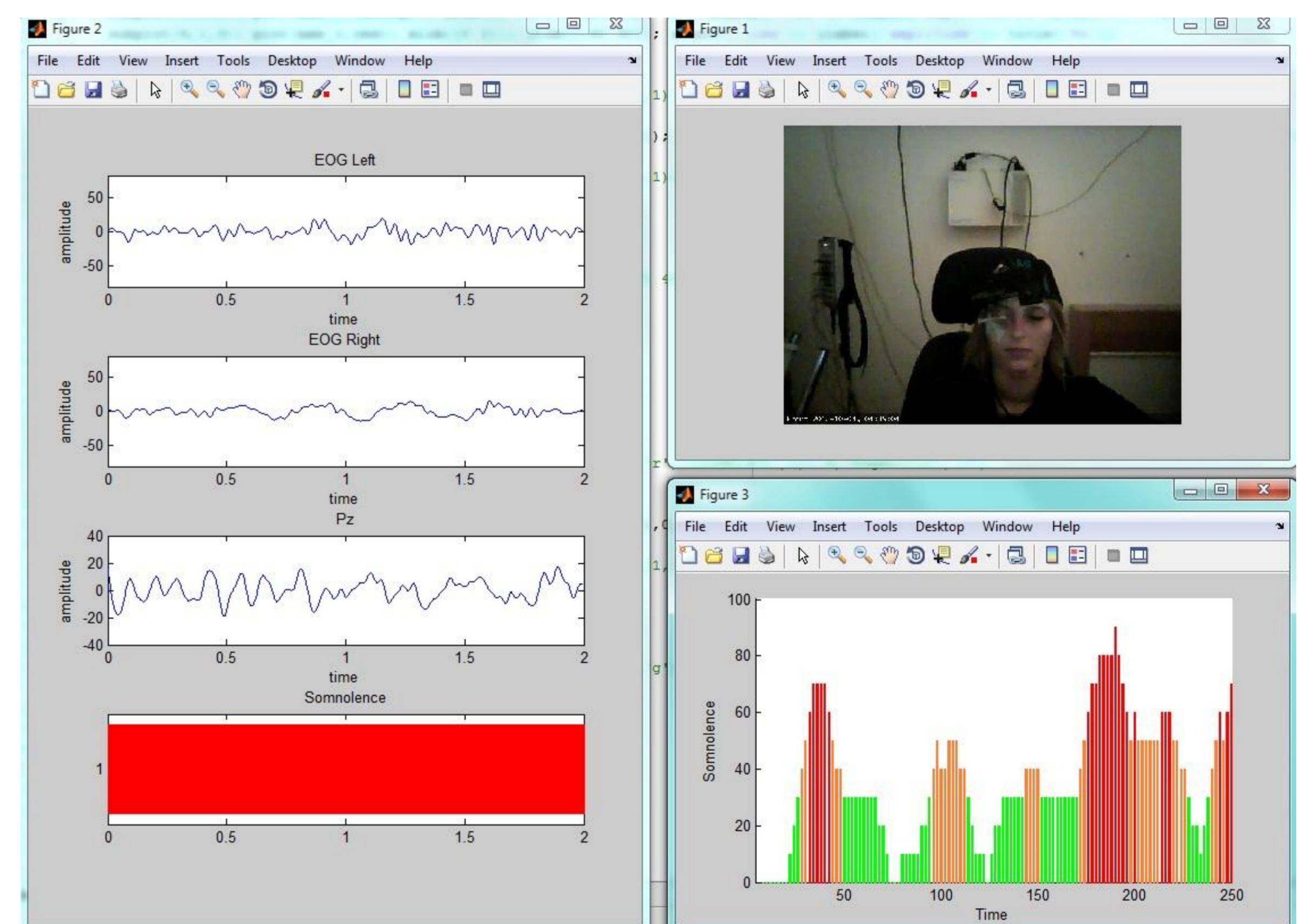


## EXPERIMENTAL SETUP

Night driving in a simulator under sleep deprivation conditions.



## RESULTS



## CONCLUSION

We have developed a system capable of quantifying drowsiness based on polysomnographic signals.

- **Primary application:** validation of other drowsiness monitoring systems
- **Secondary application:** diagnostic tool for people with excessive daytime sleepiness (EDS).

## REFERENCES

- [1] Association de Sociétés Françaises d’Autoroute, « Somnolence au volant – Une étude pour mieux comprendre », juin 2010.
- [2] P. Sagaspe, et al., « Sleepiness near-misses and driving accidents among a representative population of French drivers ». J. Sleep Res., vol. 9, 2010.

## ACKNOWLEDGMENTS

- Financial support: Walloon Region (Belgium)
- Test lab: Sleep Laboratory (CETES), University Hospital of Liège (Belgium)
- Driving simulator: IFSTTAR (France).

Contact: [cfrancois@ulg.ac.be](mailto:cfrancois@ulg.ac.be)