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Conclusions & gained  
knowledge during the 3-years  
of AWAKE Research

Evangelos Bekiaris  
CERTH/HIT

Road Safety  
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# Conclusions

- **Positive Results**

- ✓ Real time detection
- ✓ High performance - potential
- ✓ High acceptance among drivers
- ✓ Technical performance high

- **Negative Results**

- ✓ Big differences between individuals
- ✓ No true reference
- ✓ Too many experimental settings with different sensors caused problems during developing phase

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# Knowledge Gained (1)

- AWAKE has made a major breakthrough but with the current sensor technologies can not be used outside the well-structured highway scenario nor can be applicable for all drivers.
- AWAKE know-how is an invaluable starting point for further research, as it identified the lack of a “golden standard” and enough reference data, offered promising sensors for further development and reliable and robust algorithms.

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# Knowledge Gained (2)

- Existing sensors are at their limits (need for higher frequency rates, sensors physically closer to the user, more physiological signals to be recorded).
- Dependency upon behavioural sensors (i.e. lane recognition, frontal radar) needs to be ultimately removed, for rest ADAS independent application.
- No golden standard and reference data for microsleep phenomenon, limiting the success chances of the developed algorithms and hindering their objective assessment.
- Need for additional physiological data to distinguish the cause of the problem (sleepiness, inattention, stress, etc.).

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# Contribution to State-of-the-Art (1)

- HMI Development & Guidelines
  - **AIDE IP** has used the state-of-the-art of the AWAKE DWS in order to further develop effective warning strategies and elements in order to increase traffic safety Europe-wide. In addition the 'Design Guidelines Handbook' developed in AWAKE, will contribute to the standardisation objectives of AIDE.

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# Contribution to State-of-the-Art (2)

- Hypovigilance Detection & Prediction
  - **SENSATION IP** has used the knowledge gained from AWAKE in order to develop 17 micro and 2 nano sensors in order to better detect human physiological state. SENSATION also puts a big effort in order to develop sufficient data to reach a 'golden standard' for using as reference for hypovigilance prediction and detection algorithms, a big gap identified within AWAKE. SENSATION extends the hypovigilance detection algorithms also to industrial operators' fatigue monitoring including however also driver fatigue.

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# Contribution to State-of-the-Art (3)

- HMI & Driver Behaviour Modelling
  - **HUMANIST NoE** will use AWAKE results in order to achieve knowledge transfer and sharing in the areas of HMI and driver behaviour modelling, where AWAKE has achieved a breakthrough. AWAKE will highly contribute in HUMANIST aim to develop a driver cognition model in the case of hypovigilant (fatigued) driver.

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# Contribution to State-of-the-Art (4)

- Sensors & Algorithms
  - **PREVENT IP/ADMON SP** will use AWAKE knowledge in order to proceed to advanced sensor technology development and new sensor fusion approach to monitor the vehicle and its environment, as well as assess driver fatigue and hypovigilance through innovative and reliable algorithms.

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# Market Potentials: The AWAKE Products

ID	AWAKE product
1	Eyelid sensor
2	Steering grip sensor
3	Eye gaze sensor
4	Hypovigilance Diagnostic Module
5	Traffic risk estimation module
6	Driver Warning System
7	Hierarchical Manager
8	AWAKE system for cars
9	Overall AWAKE system for heavy vehicles

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# Market Potentials: AWAKE strengths

- Accident reduction.
- Unobtrusive system.
- No enforcement policy.
- Modular design.
- Higher reliability due to multiple sensors.
- Multimedia HMI.
- Good brand names.
- Market acceptance.

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# Market Potentials: AWAKE weaknesses

- Limited scenario application
- Still not negligible false alarm rate
- Diagnosis performance needs improvement
- High price

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# Market Potentials: AWAKE opportunities

- Increased awareness about fatigue related accidents
- Mature climate to introduce complex ADAS in vehicles
- Current trends in automotive industry
- Parallel developments

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# Market Potentials: AWAKE threats

- Lack of legal / insurance framework.
- Employees reactions
- Hard competition in the automotive market does not allow price enhancements
- Status of competition
- Delay in the market introduction of smart cars

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# Concluding...

- AWAKE has developed the **state-of-the-art** basis where further major research is already initiated.
- Despite the low resources and limited research period, AWAKE devoted a great effort on developing an integrated **combined** driver fatigue monitoring system.
- AWAKE broke the barrier of 'ugly' prototypes by developing **integrated** professional and marketable HMI elements.

## And most important...

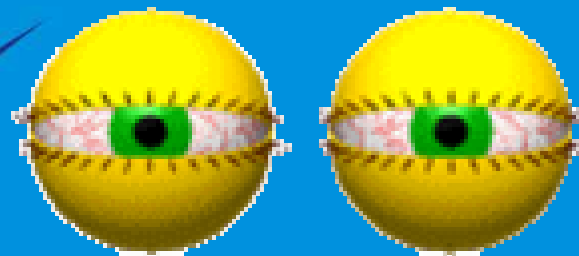
- AWAKE is the **bridge** from driving simulator environments **to real road environments** using three different demonstrator prototypes, enhancing the market potentials of such systems.

## All this effort for...

- **Enhancing Road Safety** and contribute by a significant percentage to reduction of fatigue related road accidents!



# Still AWAKE???



● If not.....



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