

Driver inactivity crash prevention

International Conference on
Driver Distraction and Inattention

29 september 2009

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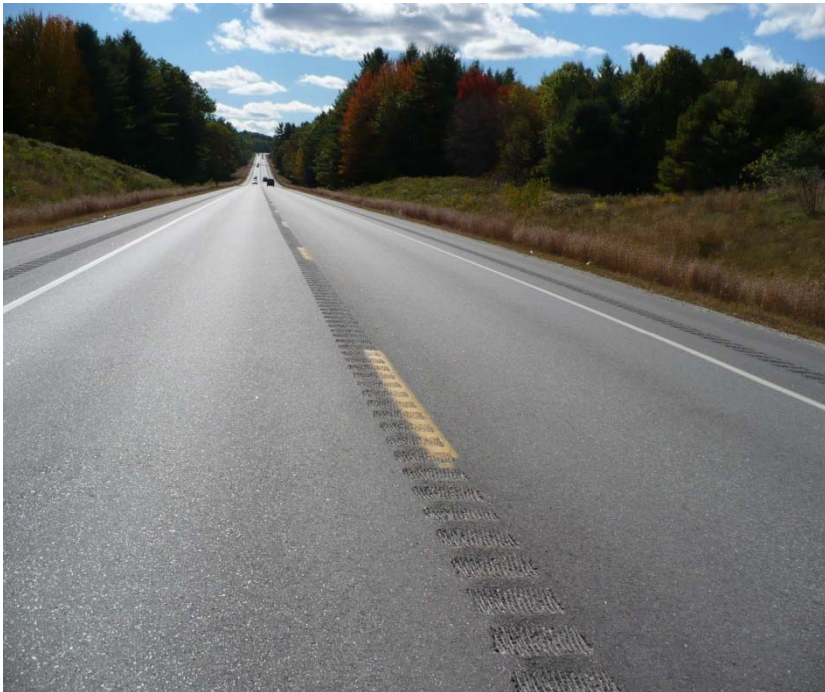
Driver asleep



= disaster

RUMBLE STRIPS and 2+1 FENCING

Very successful
Not everywhere



susen



ADAS SYSTEMS TODAY

Lane departure warning systems

Forward collision warning

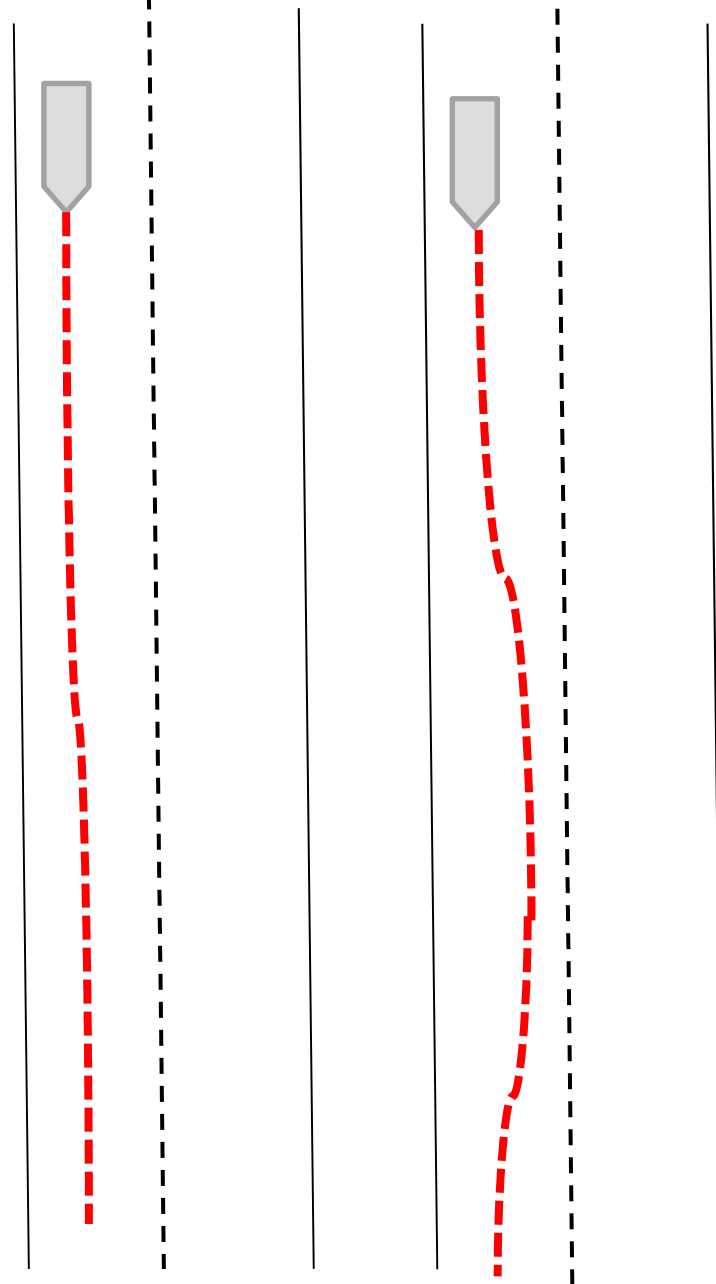
Side obstacle warning

Drowsiness warning

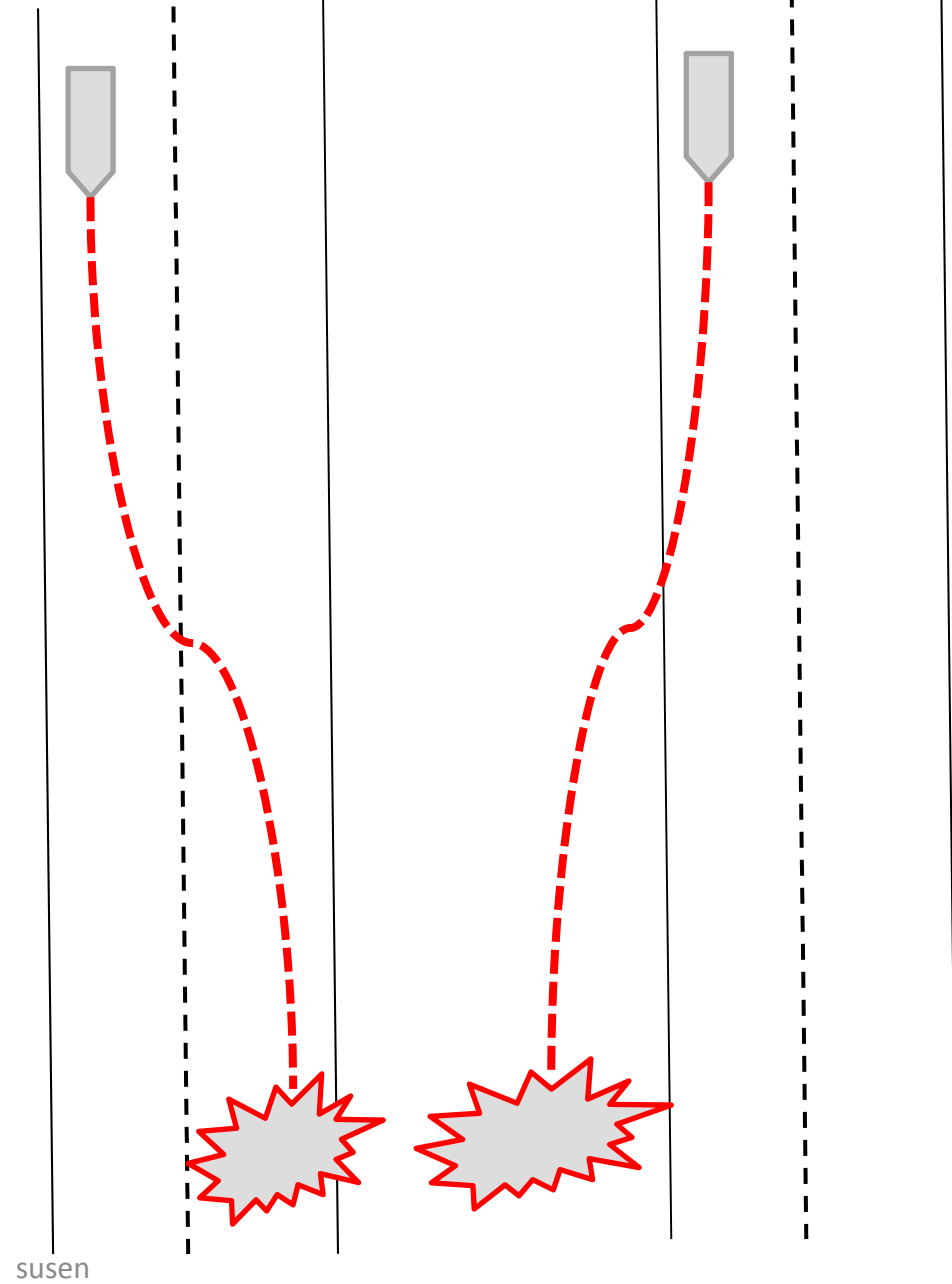
Do not predict **when** falling asleep

Not enough

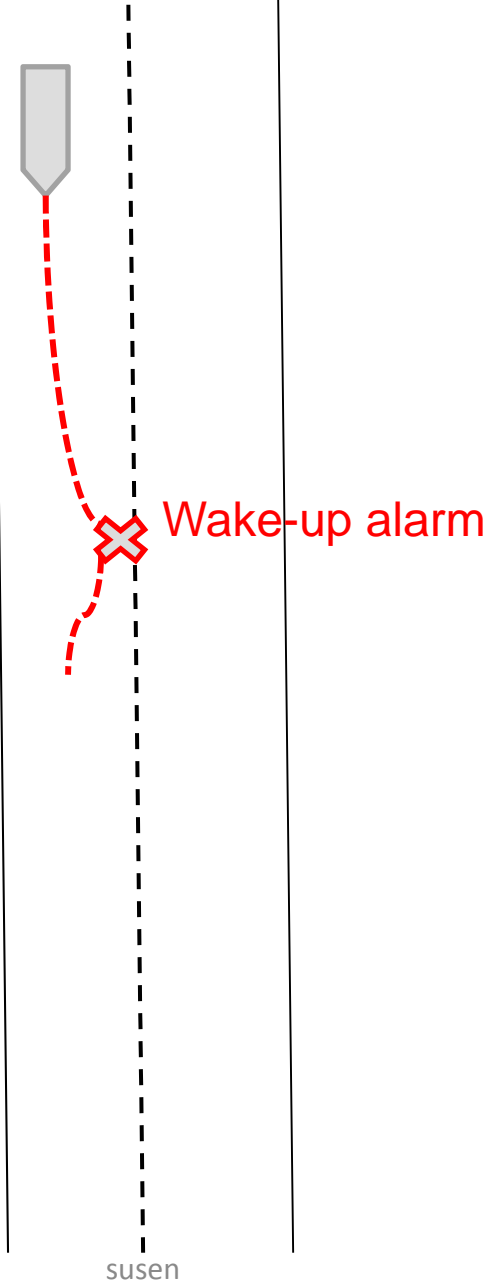
DRIVER ACTIVE AND AWAKE



DRIVER INACTIVE AND ASLEEP



NEED TO WAKE UP THE DRIVER!





DRIVER ASLEEP

How do we know?



WAKE UP THE DRIVER

to steer within a second



WAKE UP THE DRIVER

Without a false alarm!

Real-time tests 2008/2009

Steering behavior

active driver

Inactivity :

Normally < 2 seconds

Never > 4 seconds

20 drivers KSS 3-9

Vehicle behavior

inactive driver

Time to reach lane border
without steering

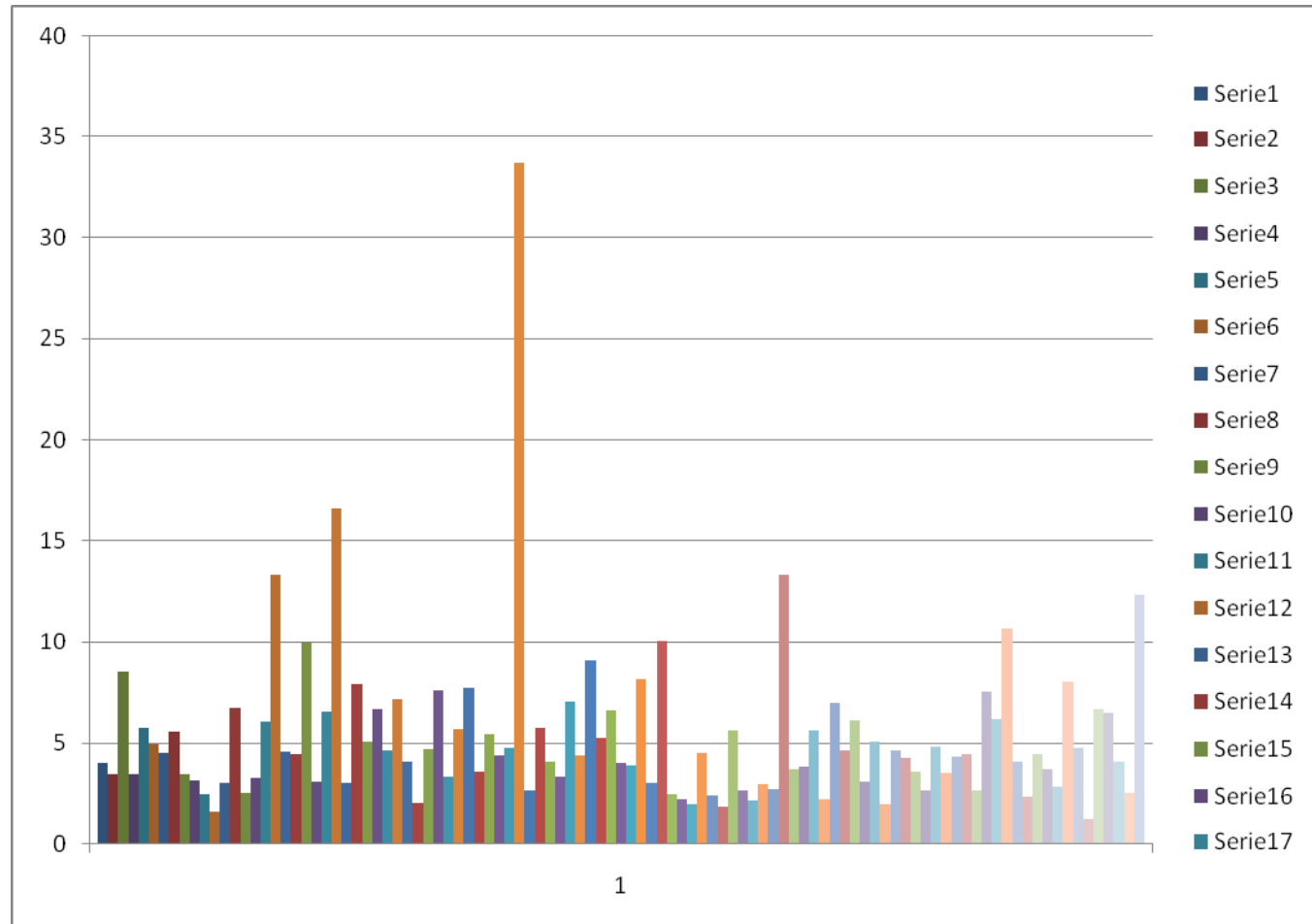
$1,2 < t < 34$ seconds

Average 5,8 seconds

200 test runs

CONCLUSIONS: • DRIVER ASLEEP WHEN INACTIVE ~ 5 SECONDS
• OUT OF LANE AFTER ~ 1 SECOND OR MORE

Vehicle tests 2009. Steering wheel inactive time until vehicle at lane borderline, seconds. (100 runs)



CONCLUSION: ONLY A FEW SECONDS TO PREVENT AN ACCIDENT



WAKE UP THE DRIVER

When?

Where?

How?

Asleep or danger

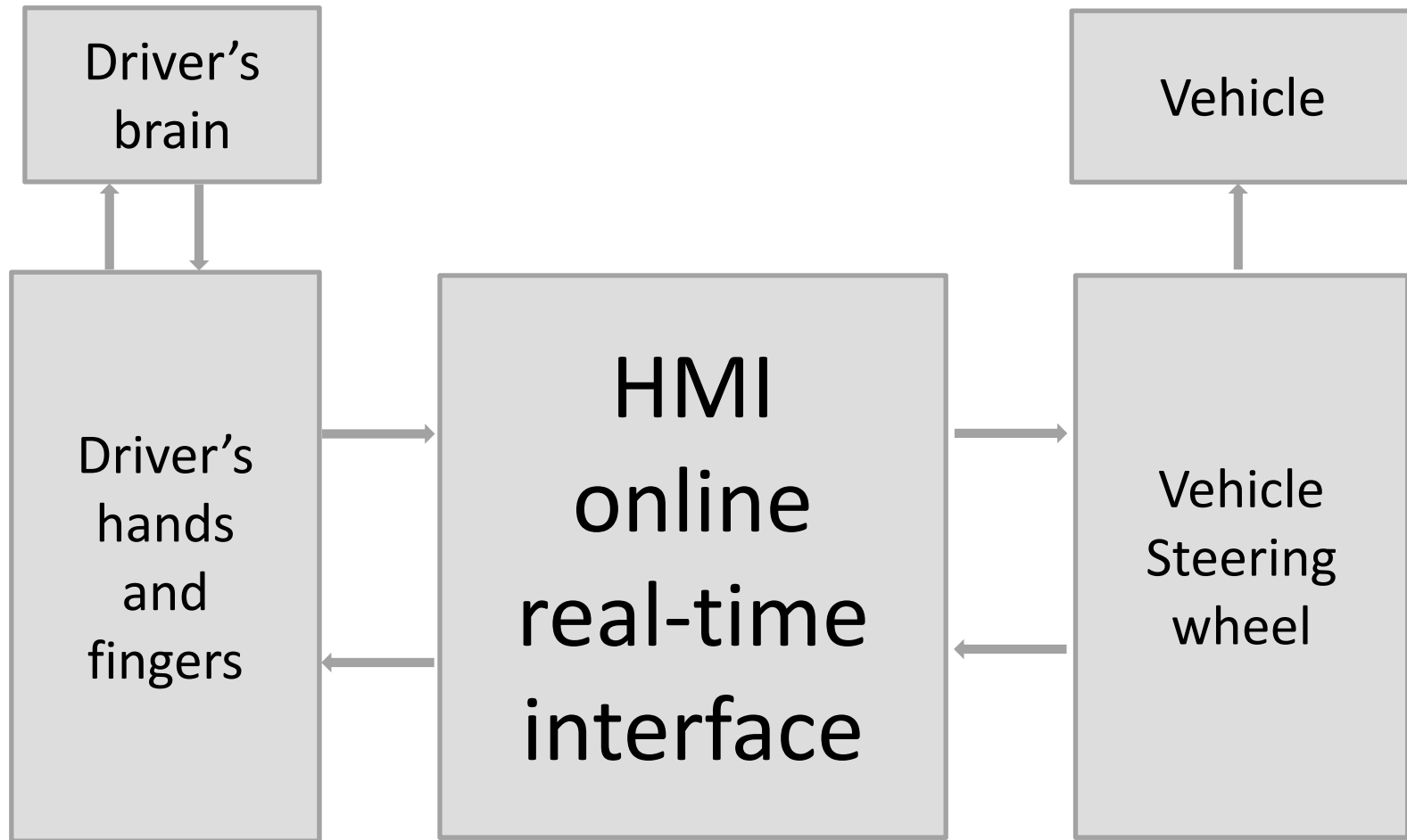
Anywhere on the road

Of crucial importance



Wakedrive®

WAKEDRIVE CENTERS AROUND THE HMI INTERFACE



WAKEDRIVE HMI INTERFACE

Other warning
sources

2

3

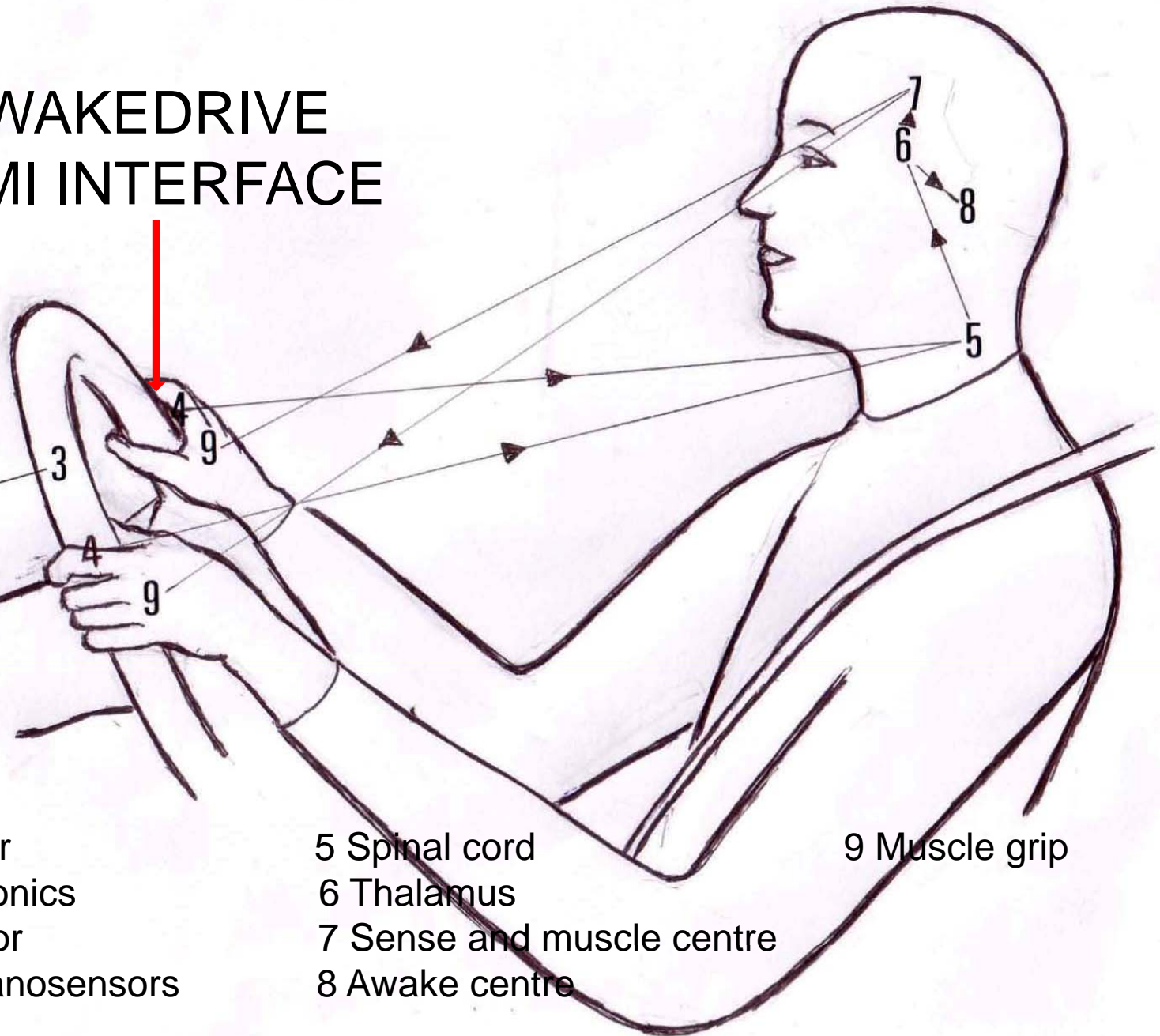
4
9

1

- 1 Sensor
- 2 Electronics
- 3 Vibrator
- 4 Mechanosensors

- 5 Spinal cord
- 6 Thalamus
- 7 Sense and muscle centre
- 8 Awake centre

- 9 Muscle grip

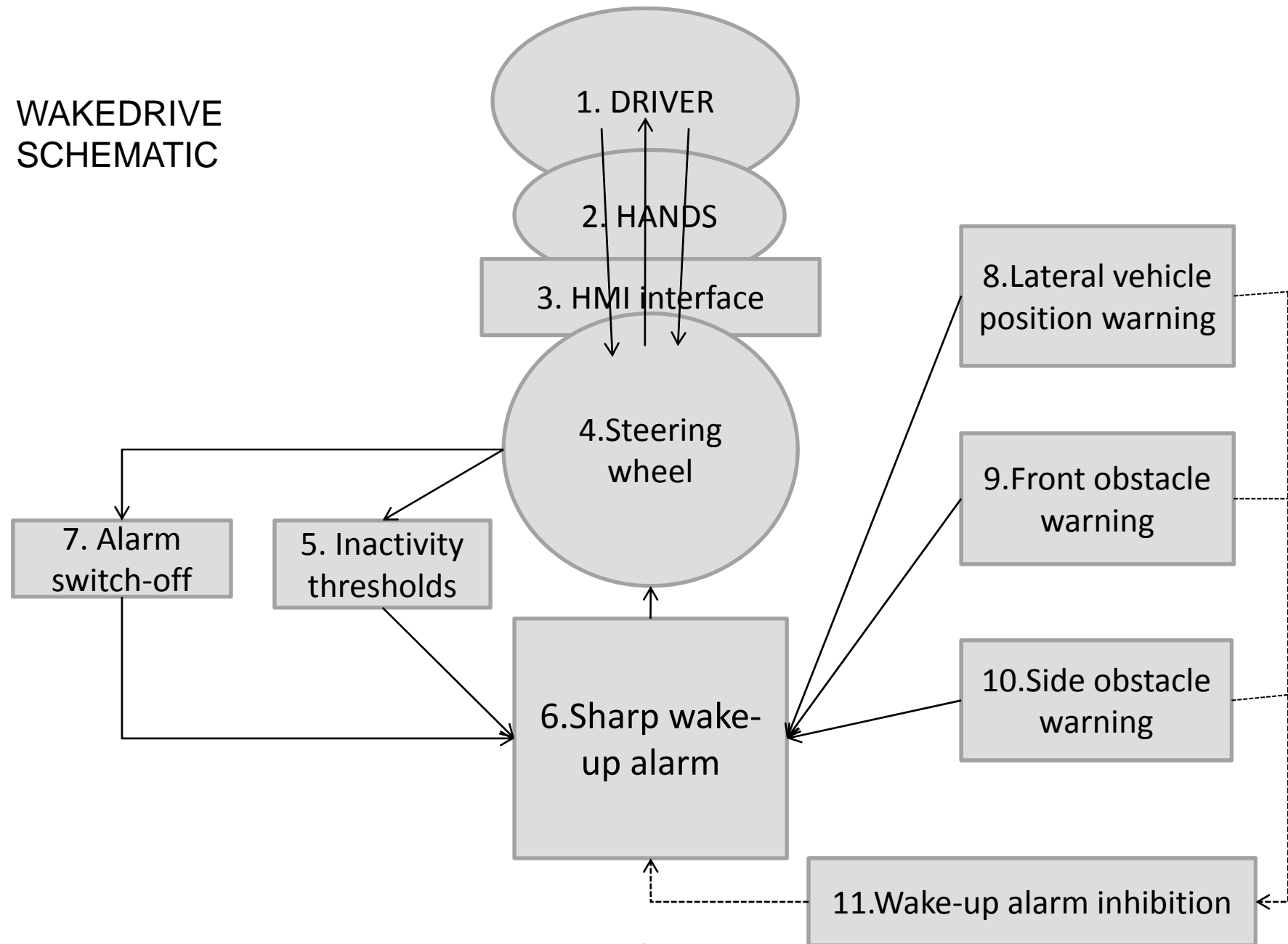


The Vibsec method

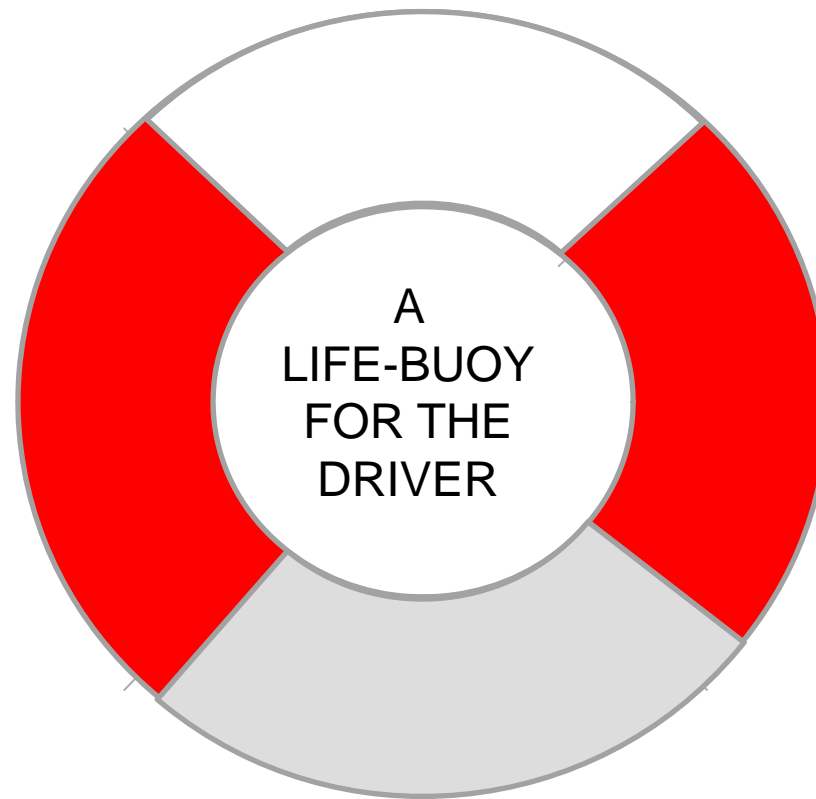
- ✓ Certain steering wheel vibrations
 - ✓ Meissner ~ 50 Hz
 - ✓ Pacini ~ 250 Hz

Google search: Vibsec.se

WAKEDRIVE SCHEMATIC



WAKEDRIVE CRASH PREVENTION



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Questions?

Immaterial rights

Svenska Utvecklings Entreprenören SUSEN AB

Patents pending

Trade marks: Wakedrive

VibSec AB

Patents: SE 529656C2; PCT WO 2007/136338A1

Trademarks: Safedrive

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