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A digital car driver assistant

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Outline presentation

- 1. Goal of the project*
- 2. Model car assistant*
- 3. Architecture of the system*
- 4. Experiments*
- 5. Conclusion*

Guardian Angel



Guardian angel

Modelled as a smart autonomous agent, which is able to observe the environment, to reason about observed data and to take appropriate actions

Automated pilot F16

based on analysis system parameters from the plane



Virtual co-driver

Multi-modal observation of the car driver



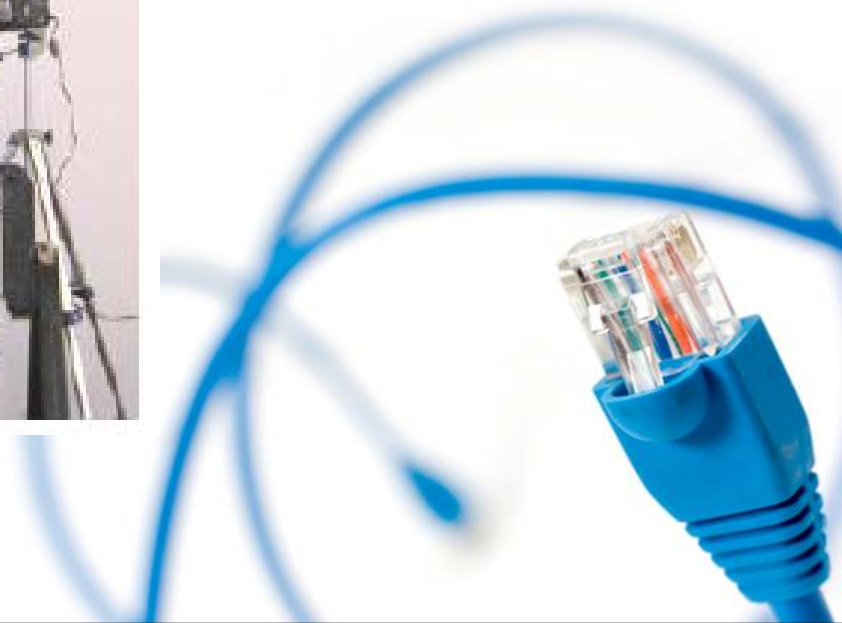
Research Goal

- Is it possible to design a digital guardian angel of a car-driver based on sensor input?
- Is it possible to model car driving as a sequence of observable states?
- Is it possible to detect characteristic features for every state?

Sequence of observable states of driver during take-over

- Car-driver inspects his mirrors to see if the left lane is free
- Car-driver switch on his signal lights
- Car-driver accelerates
- Car-driver drives to the left lane
- Car-driver inspects via his mirrors if the right lane is free
- Car-driver switches on his right-signal lights
- Car-driver drives to the right lane
- Car-driver adapts his speed

Driving simulator with car mock up CTU-2003

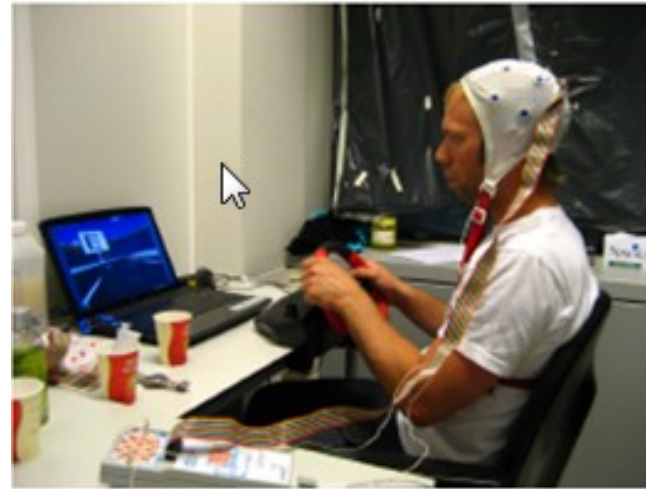


Suspicious violent behavior of car drivers

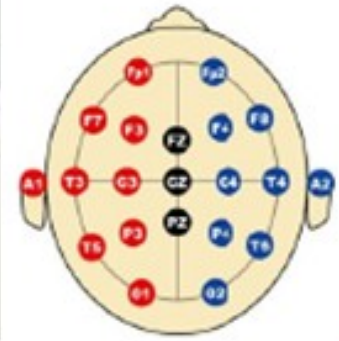
- Violation of traffic rules
- Car crashes
- Fleeing cars after an incident
- Showing aggressive driving behavior (bumper stick, hunting, cutting off)
- Showing aggressive body language
- Shooting, showing weapons
- Dropping garbage

Driving simulator

TORCS-braincomputing-KINECT



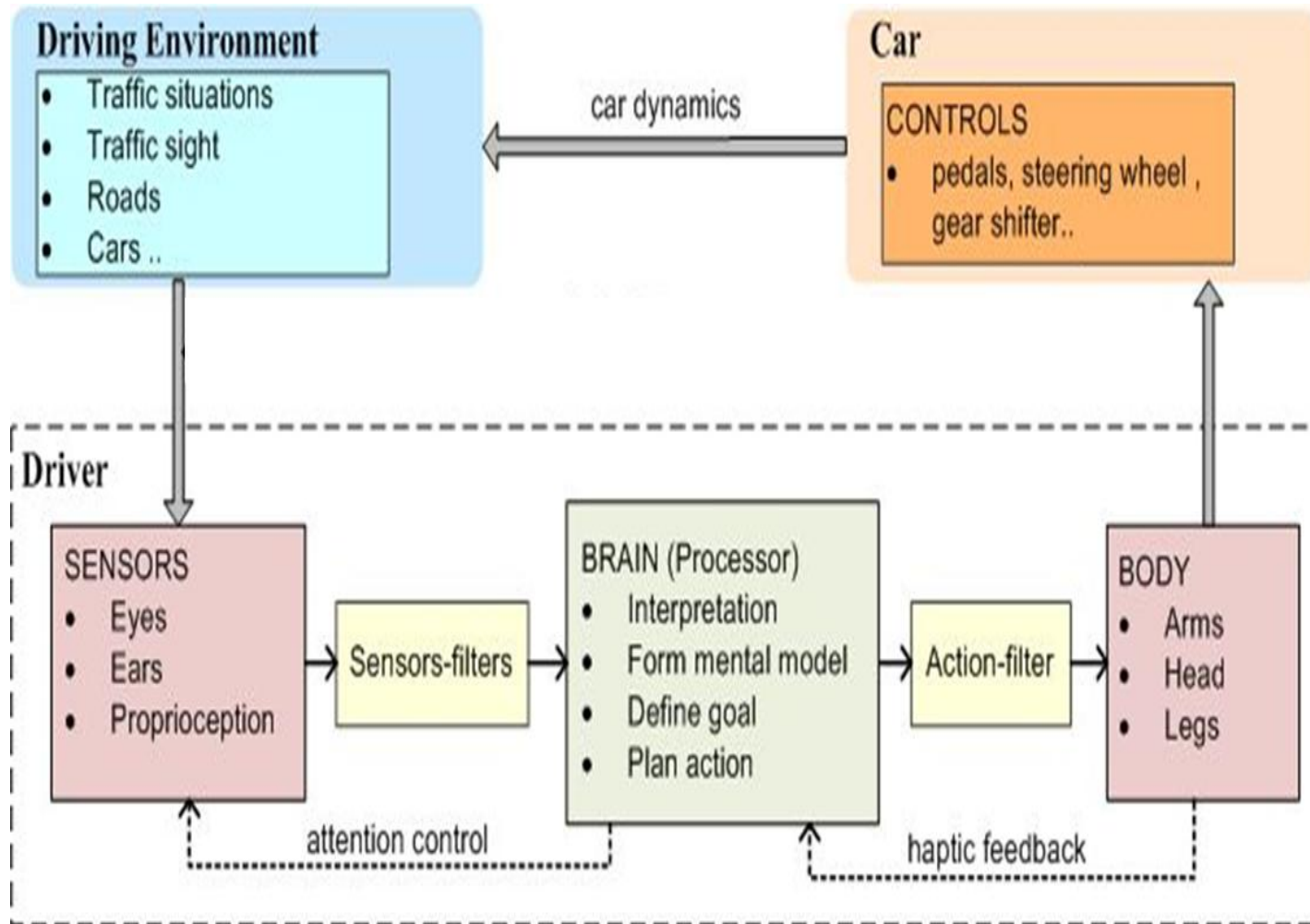
(a)



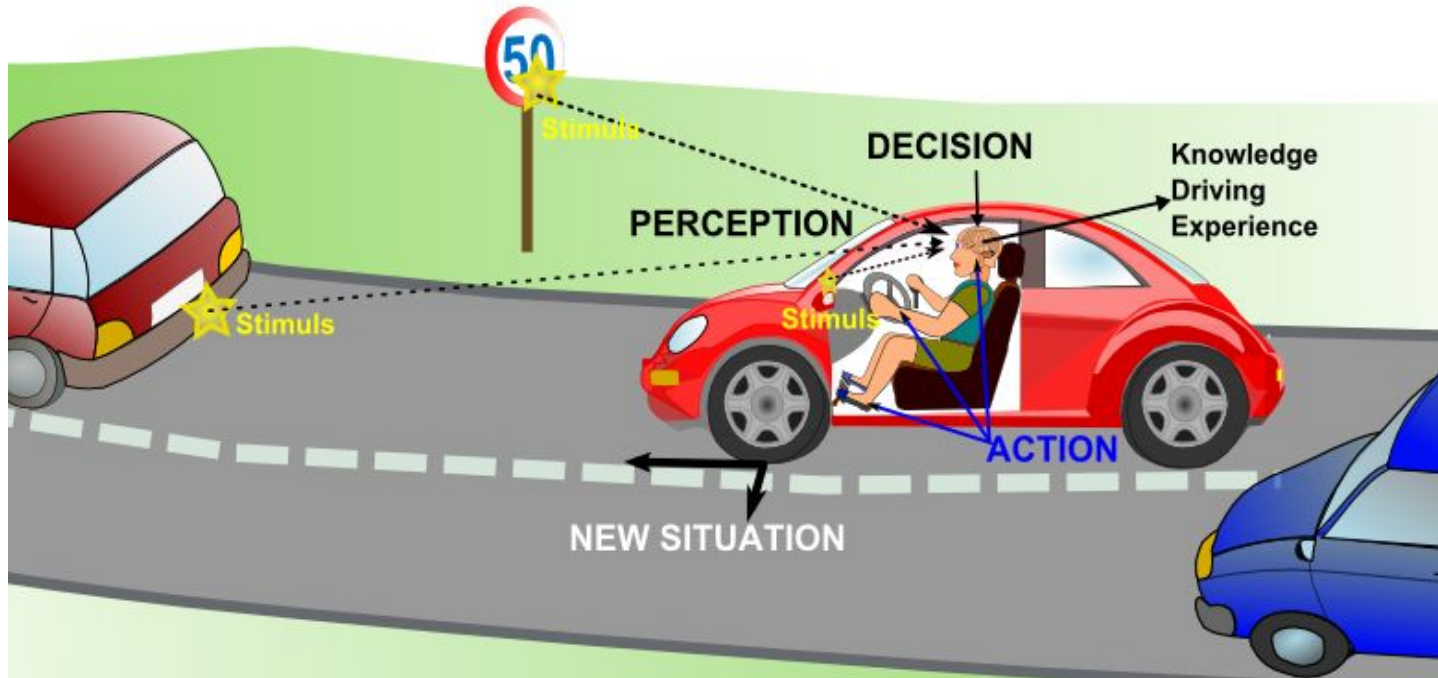
(b)



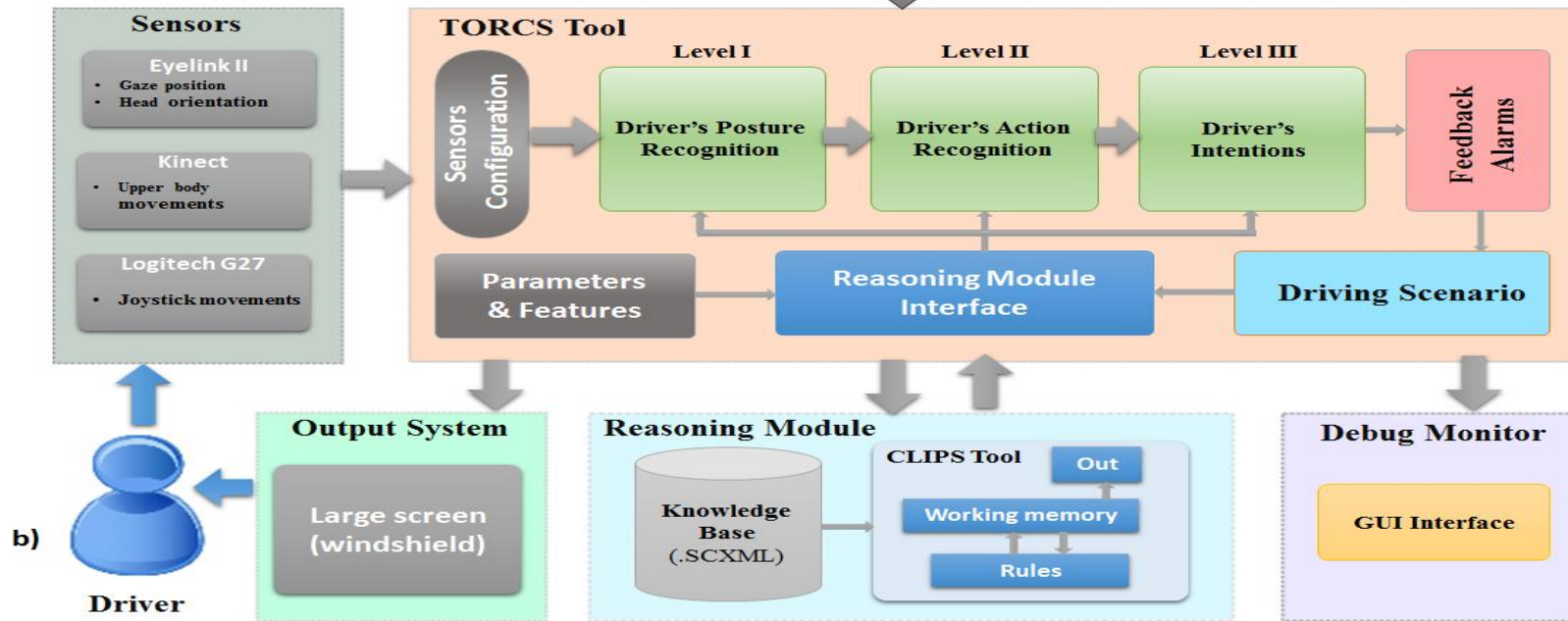
Control loop driver-car-environment



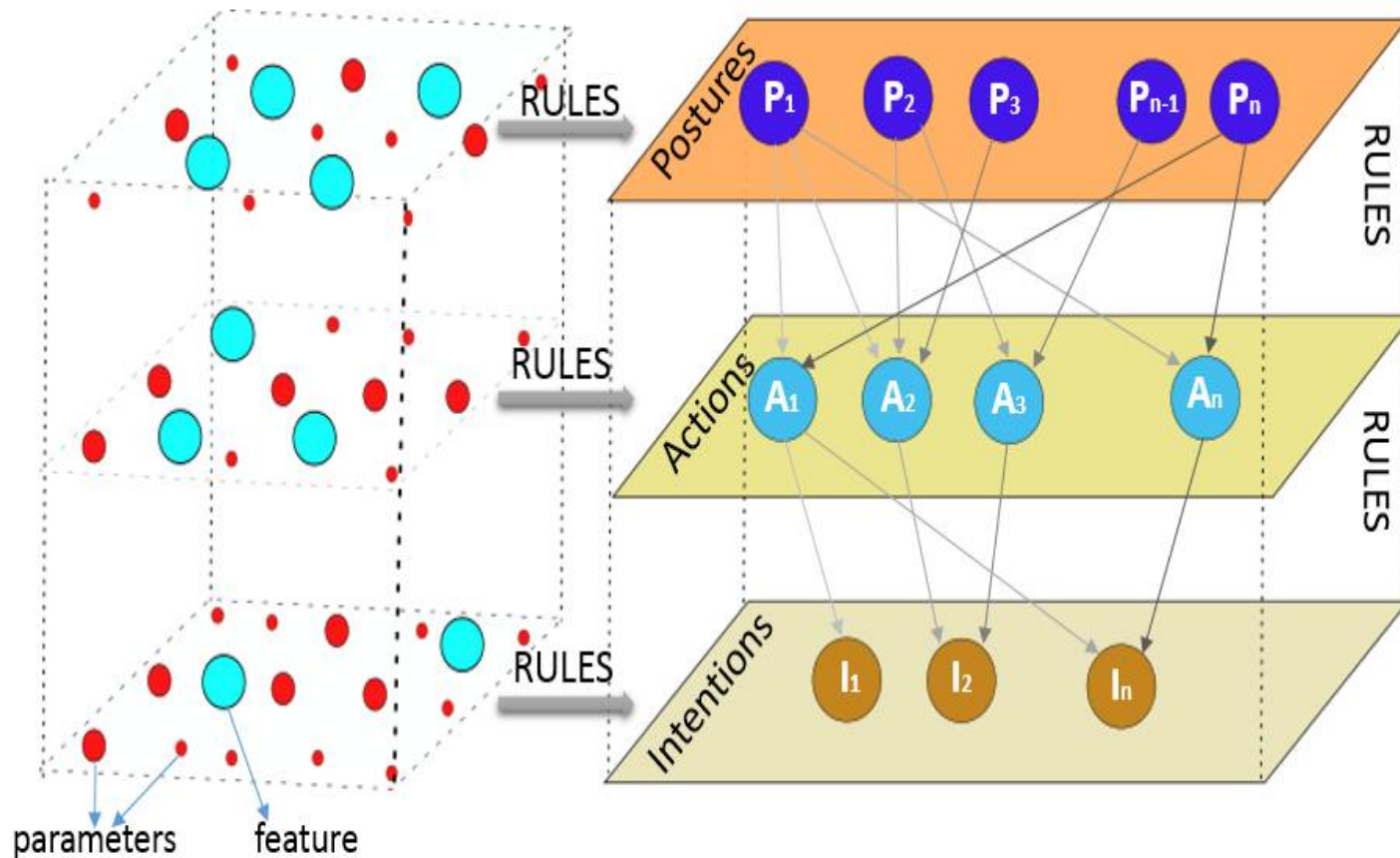
Basic Driver Perception-Action Process (Belief-Desire-Intention)



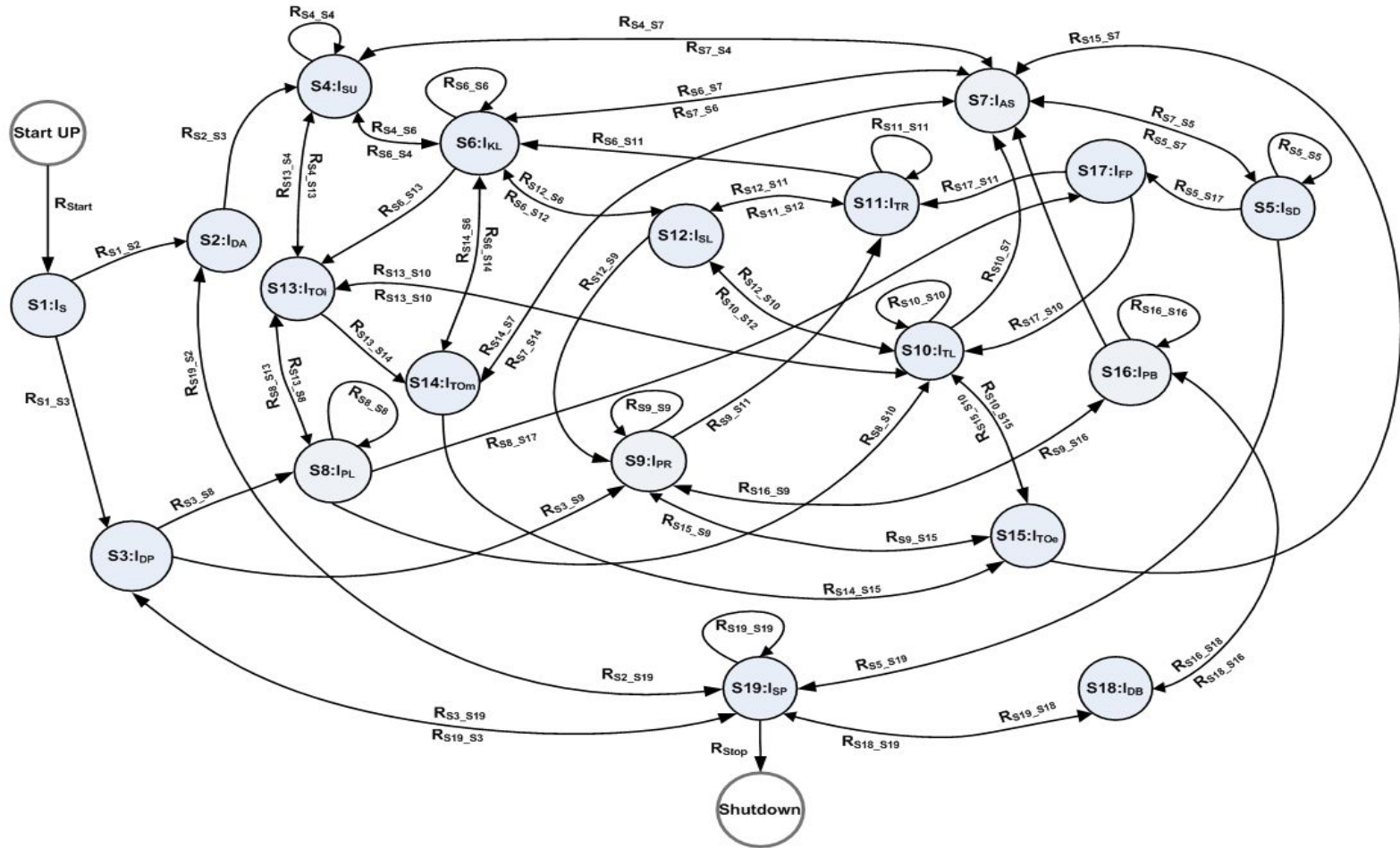
Set-up experiment System architecture



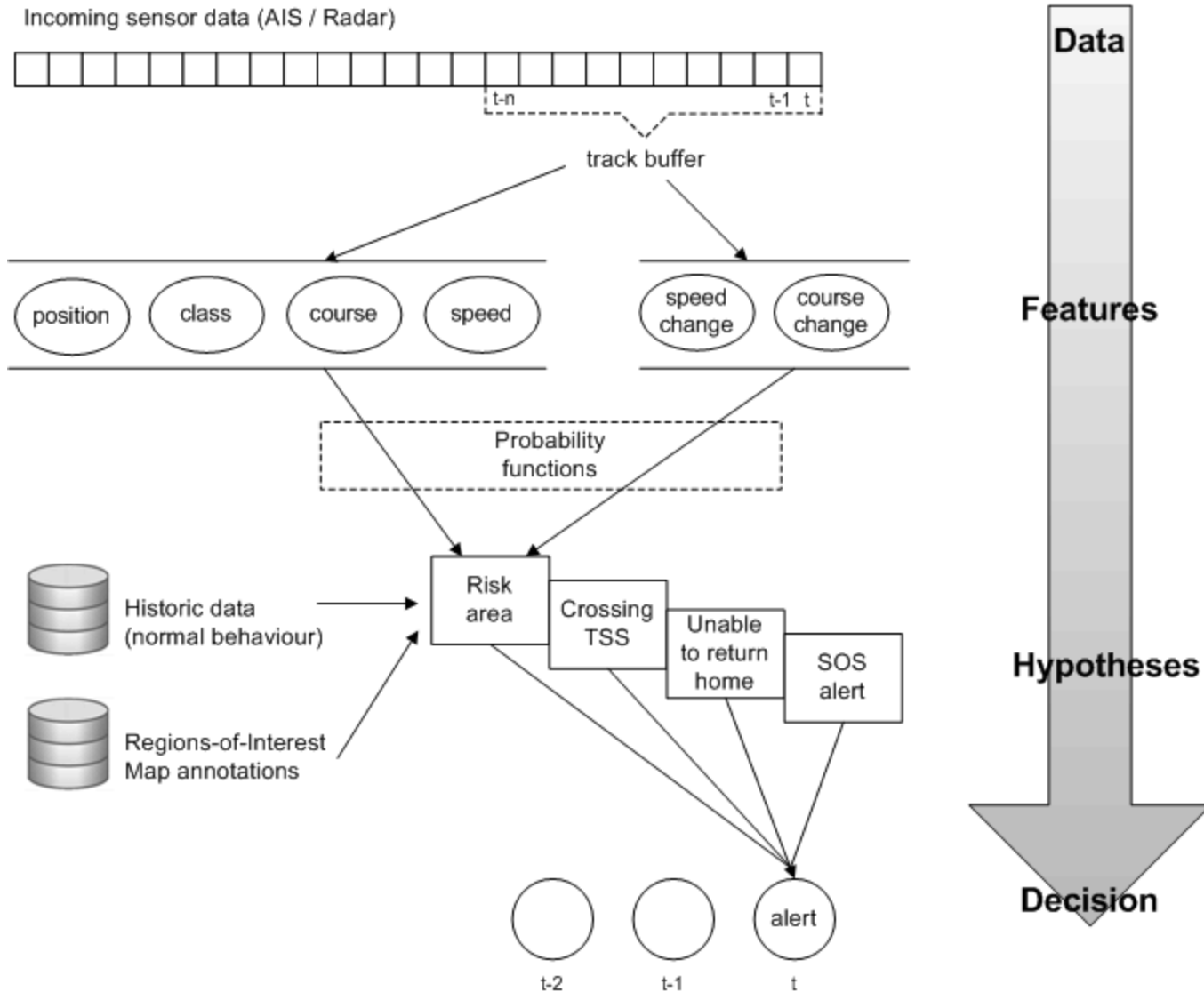
Cardriver's intention recognition



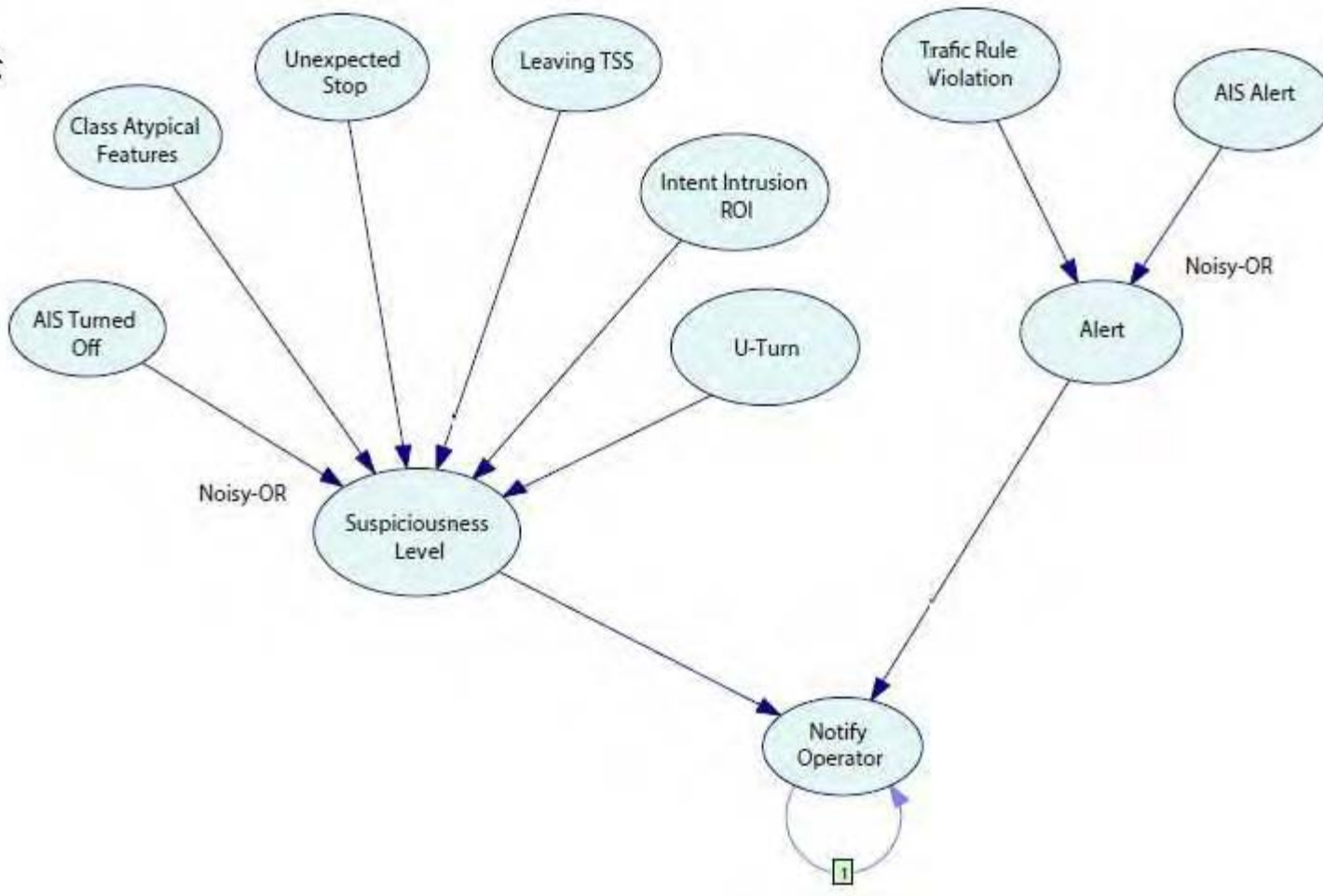
State diagram of driver's intention and transition rules



Rule based reasoning



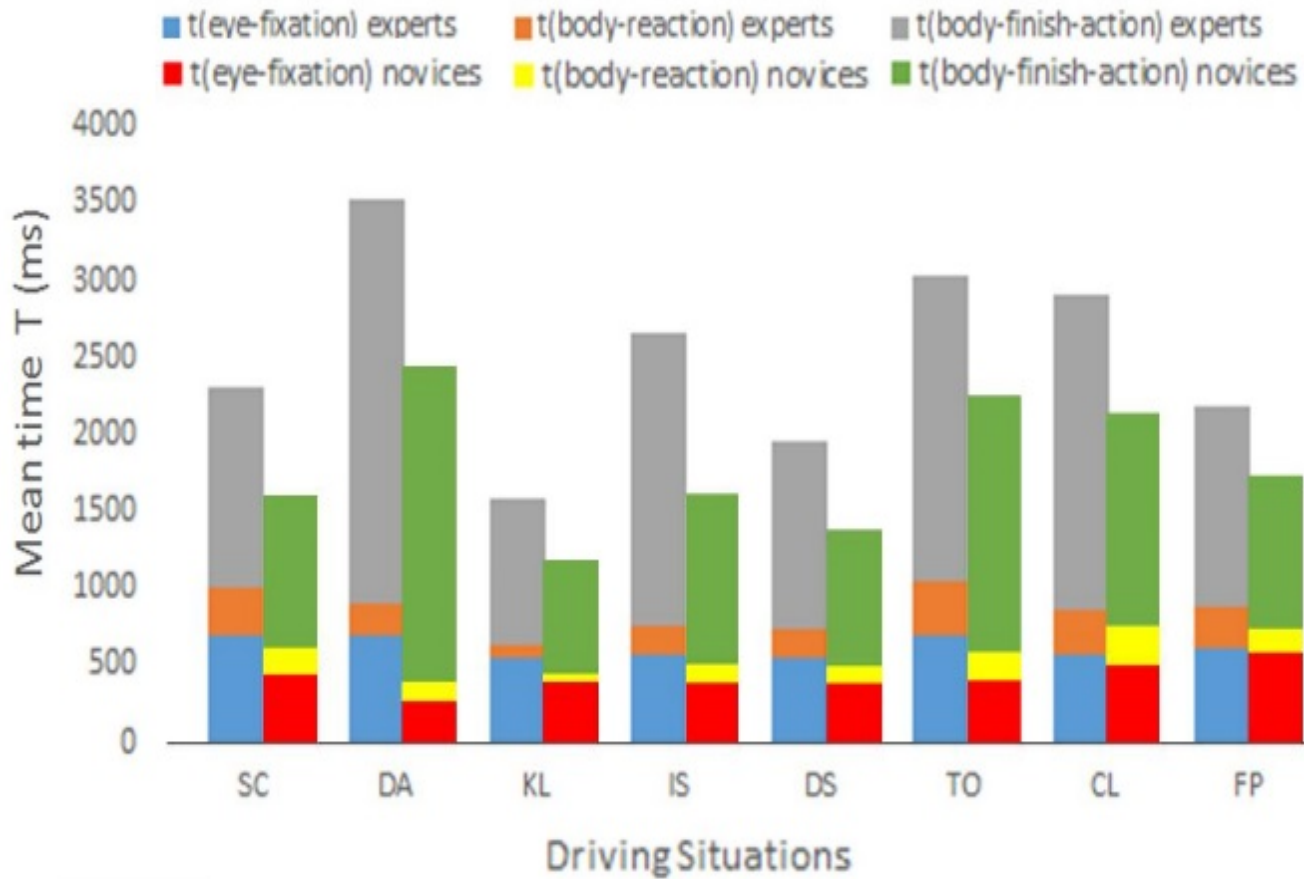
Bayesian reasoning



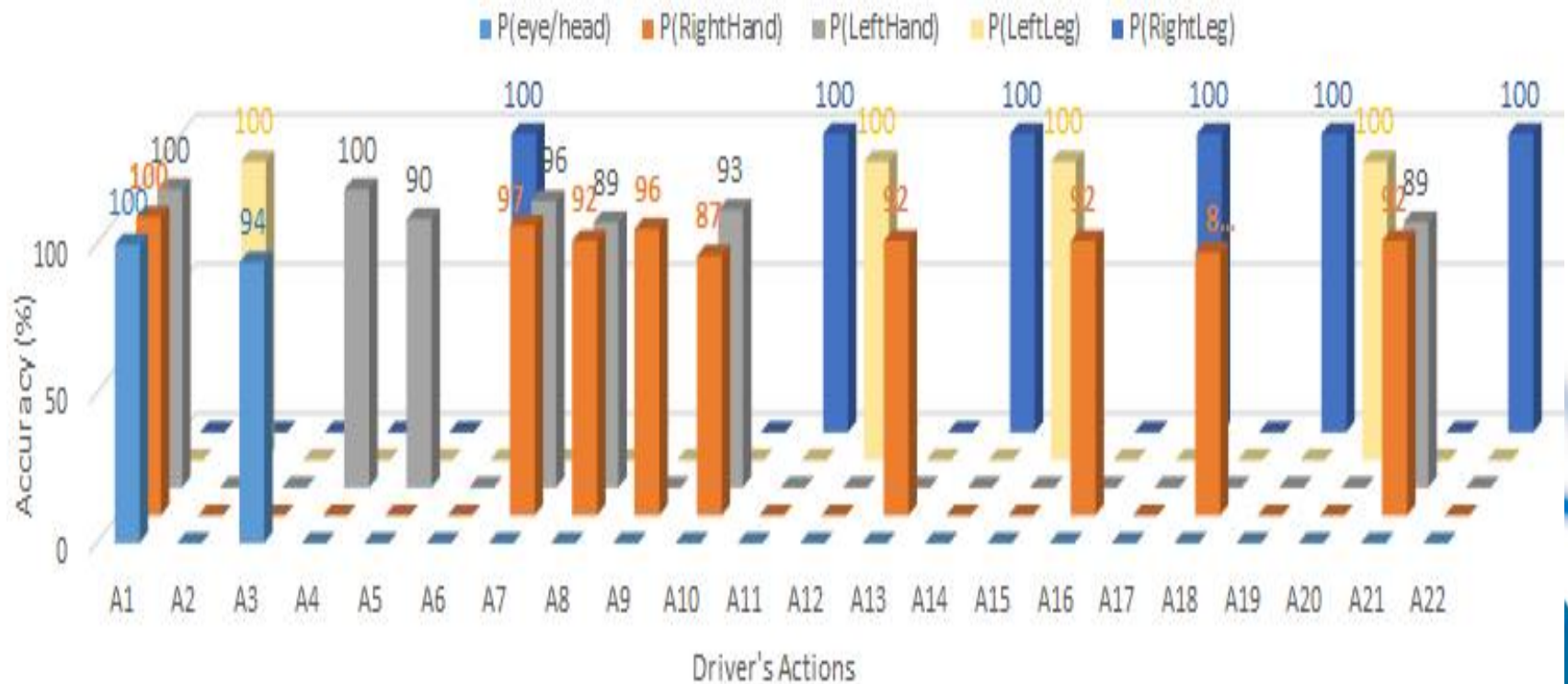
Alarm feedback



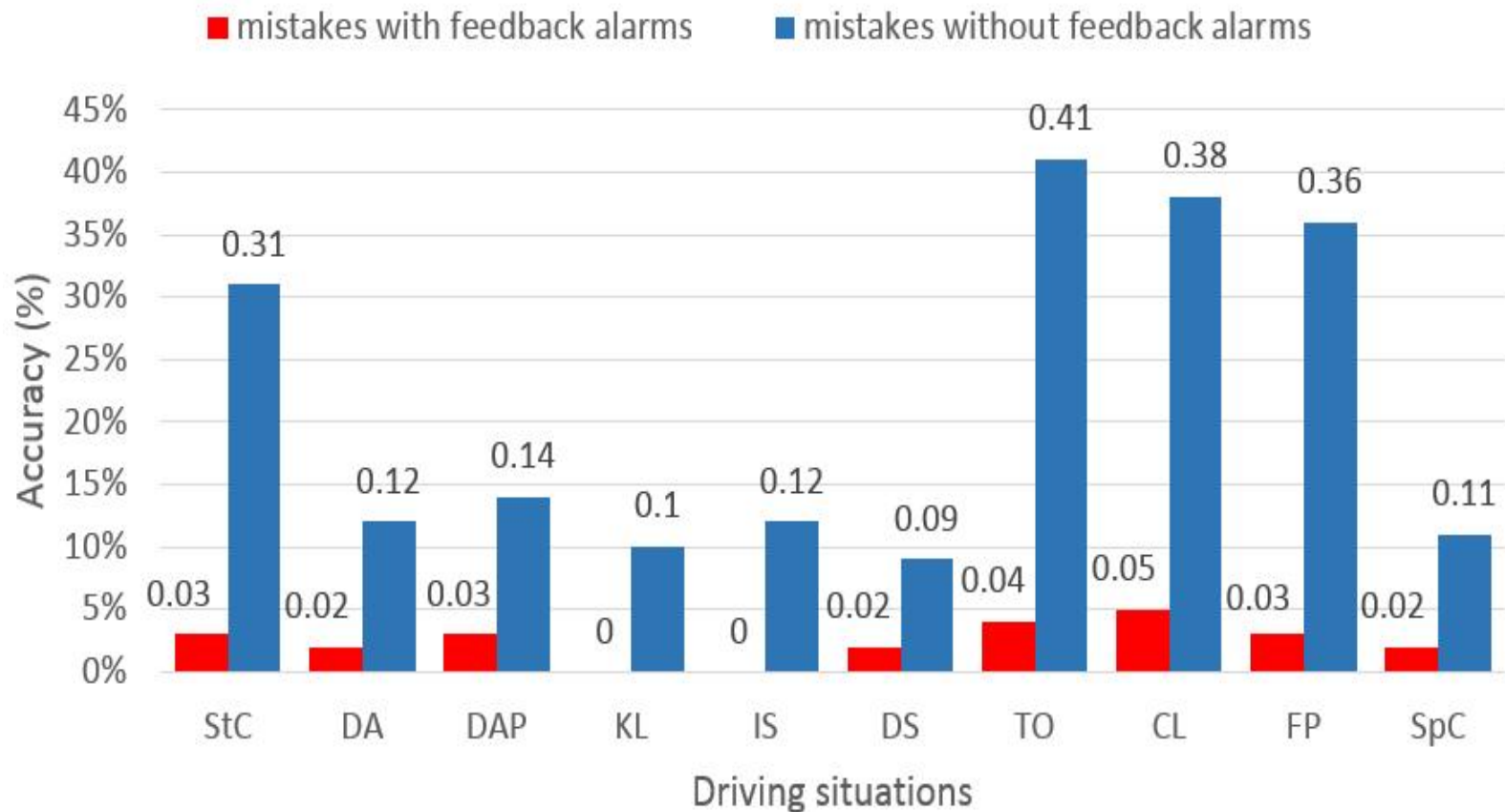
Experiment



Accuracy of action detected with set of postures



Correctness of driver's mistake using alarms feedback



Questions ??