LaRA : a partnership, a new dedicated lab

- An umbrella for 5 research institutes and engineering schools: INRETS, LCPC, INRIA, ENPC, ENMP

- A Partnership
  with industry: Renault, PSA, Daimler Chrysler, EDF, Sagem, Lemförder…
  with universities and other research units: french universities and engineer school, CNRS, university of Berkeley, Carnegie Mellon, TNO, Dutch Dot
A new dedicated Lab : LIVIC

- A new multi-disciplinary mixed INRETS-LCPC Research Unit located in Versailles-Satory, 16 permanent staff
  - Perception techniques,
  - Modelling, Control and filtering techniques,
  - Architecture and communication,
  - Statistics and Metrology,
  - Cognitive Sciences
• Reception site for Researchers
  • Electronic laboratory and workshops
  • several equipped vehicles
  • and test-tracks
Exemple of experimental vehicle
LARA / LIVIC objectives

• to develop Advanced Driving Assistance Systems (ADASE) being extended to full automation
  – Propositions for traffic enhancement: capacity, security, environment
  – Identify and assess new concepts and develop non-mature technical functions
  – Devices acting on the functioning of the system vehicles-infrastructure-drivers
  – Integrate ADASE systems in an architecture that guarantees inter-operability
  – Take into account human factors at all levels
Research program

LIVIC
LaRA
4 Scenarios for RA (see ITS Seoul)

- Safety oriented functions for rural roads
- Automated highways for trucks
- Suburban automated highways
- Guided paths in urban areas
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The « Safe trajectory concept »

- **trajectory**: curve followed by the vehicle which at each point has specified speed, acceleration and jerk

- **ERD**: Entity Responsible for Driving (driver helped by driving aids). ERD must keep actual trajectory close to the computed safe one
SC1 : consequences of the trajectory concept

- Each vehicle has its own safety region
- Roads give:
  - the mandatory rules
  - the reference trajectory
  - comprehensibility and interpretability to ensure "controllability"
- Legal changes will lead to modifications
  - drivers are no longer 100% responsible
  - courts and lawyers will stress this
SC1: applications

- LIVIC: exploration of risk modelling from permanent and non-permanent road key parameters
- ENMP/MAIF: on board signalling systems
- LCPC/DoT: DSRC for safety in rural network
4 Scenarios for RA (see ITS Seoul)

- Safety oriented functions for rural roads
- Automated highways for trucks
- Suburban automated highways
- Guided paths in urban areas
• Precursor evaluation of a progressive RA scenario
  – capacity/safety discussion
  – influence of optimisation aspects on capacity/safety dimensions
    » sensivity to parameter accuracy, network geometry,
    » control system
  – evaluation of cost and benefits (Paris case studies)
  – deployment phases, evaluation of ADASE systems
Mixed traffic at 60km/h

Security (nb of death et serious injuries)

Capacity (x 2240)

Minimal anticipation

Maximal anticipation

ACC++

RA

2800

3700

4000

5200

5600
• 4 Scenarios for RA (see ITS Seoul)

- Safety oriented functions for rural roads
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SC4 : Guided paths in urban areas

- INRIA/LIVIC/ Rhône district
  - a guided path in LYON East shared by 3 vehicle types:
    » guided bus
    » automatic shuttle
    » automatic rental (self service) cars
  - one year contract for
    » defining an experiment
    » a functional and technical analysis
    » building a consortium

- INRIA Rocquencourt demonstration : end 2000
  - 5 automated electric vehicles
Developments go on

- CAR-SENSE: a 5th framework program improving on board vehicle sensing -lidar, radar, computer vision, multi-sensing fusion

- MICADO: a DoR contract for obstacle detection

- Lateral and longitudinal control at low speed
  - several instrumented vehicles in preparation

- Precursor analysis of trucks automation: PREDIT
Conclusion

LaRA / LIVIC

- A large French research program regarding RA at 3 levels:
  - conceptual studies, technical developments, trials
- An implication in European framework program (ADASE, CAR-SENSE…)
- A wish to find a progressive path toward automation for France and Europe contexts