Workshop on

Autonomous and Cooperative Intelligent Vehicles: new safety and security challenges, or yet another critical infrastructure?

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Autonomous systems/functions

- Autonomous vehicles and vehicular functions are not new in some transportation domains:
  - Autonomous trains, auto piloted airplanes
  - Potential hazards can be quite well characterized and dealt with
  - It is possible to assure high levels of safety
- Autonomy in the automotive domain is growing:
  - Some specific functions being made autonomous and available in production vehicles
    - Cruise control, automatic braking, lane keeping, autonomous parking, …
  - Full autonomy, only (already!) in test cars
    - Google, Volvo, …

Some potential benefits

- Comfort
  - Driverless vehicles, people become free to do other things while on the move
- Cost
  - Vehicle control designed for efficient fuel usage, shortest/cheaper route selection
- Safety
  - Digital systems can be more reliable than humans

Technology push

- Sensor technology
  - Small, accurate, robust, cheap, diverse
- Data storage and processing technology
  - Large, fast
- Communication technology
  - Varied, high throughput wireless
  - Standards for car2x communication

Society pull

- Increasing traffic density
  - Need for efficient road and air space usage
  - Need for better traffic management
  - I.e., need for intelligent vehicles
- Increasing awareness for the need to protect the environment
  - Need for better use of resources
  - I.e., need for intelligent vehicles

Some challenges

- Uncertain environments and hazards
- Keeping humans in the loop
- Lack of regulations
- Need for backward compatibility
- Solving a Safety/Performance/Cost trade-off

Proposed topics

- Can security be handled separately from safety?
- Do we have frameworks to deal at the same time with safety and security requirements?
- Legal restrictions vs technological restrictions: which are the main obstacles for autonomy?
- From the autonomous single vehicle to an infrastructure of smart connected autonomous vehicles: is this a new critical infrastructure?
- From autonomous to cooperating vehicles: just a small step, or a major endeavour?
- Initiatives and example systems: where are we right now?

Other discussion topics

- Autonomous vehicles:
  - Are we moving towards a **vehicle as a service** paradigm?
- Vehicular networks (car2car, car2infrastructure):
  - What are the **implications on security**?
- Going cooperative:
  - How to better **explore cooperation** possibilities?
  - Need for standards and appropriate **business models**: are there advantages for car makers?
- Distributed systems solutions:
  - Can we use existing **protocols**? (e.g. group comms, consensus, failure detectors, etc)

Workshop sessions

- **Session 1: Dependability challenges for autonomous cars (Chair: Henrique Madeira)**
  - *Aspects and Challenges on the Way to upcoming Automated Cars* (Stefan Poledna, TTTech)
  - *Challenges in Dependability and Verification for Self-Driving Cars* (Jonas Nilsson, Volvo Cars)
- **Session 2: Safety assurance (Chair: John Rushby)**
  - *Safe and Unsafe Disagreement in Vehicular Ad-hoc Networks* (Johan Karlsson, Chalmers University of Technology)
  - *Assessment and certification of SEooC components* (Jonny Vinter, SP)

Workshop sessions

- **Session 3: Dependability challenges for airborne vehicles (Chair: Andrea Bondavalli)**
  - *On the security and safety of airborne cooperative vehicles on the battlefield* (Roberto Gallo, Kryptus)
  - *Fly me to the moon ....* (Michael Hinchey, Lero)
- **Session 4: Concepts and Techniques for autonomous and vehicular systems (Chair: Jean Arlat)**
  - *What is Autonomous Decentralization Concept and its escalation?* (Hirokazu Ihara, Hitachi)
  - *Executing simultaneously time-critical and best-effort tasks on multiprocessors* (Gilles Muller, INRIA)