IEEE IROS Abu Dhabi 2024

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Safety of Intelligent and Autonomous Vehicles: Formal Methods vs. Machine Learning approaches for reliable navigation (SIAV-FM2L)

IROS'24, **SIAV-FM2L Workshop**, Abu Dhabi, Emirats Arabes Unis
15th October, 8h00-12h00, Room 6

Workshop organizers

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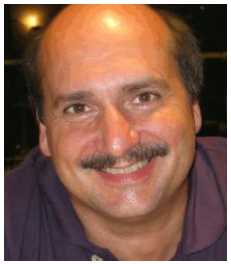

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TECHNICAL COMMITTEE FOR AUTONOMOUS GROUND VEHICLES AND INTELLIGENT TRANSPORTATION SYSTEMS

Main topic of interest:

The workshop encourages contributions coming from applications of formal methods or machine learning approaches reporting on original research, work under development, experimental results and high fidelity simulations protocols, related, but not limited, to one of the following topics:

- Safety modeling, analysis, validation and testing
- Motion planning for safe maneuvering
- Control architecture design and standardization for flexible navigation and guidance
- Risk assessment and management under uncertainty
- Long-term autonomy
- Safety and flexibility in connected and cooperative I/AV
- Simulation benchmarking for characterizing safety
- Model-driven and data-driven methods increasing safety, reliability, and flexibility
- Safety in advanced driver assistance systems (ADAS)
- Perception, localization, and map-building methods for safe applications
- Applications of I/AV in the public, freight and agriculture transportation domains
- …

Keywords: Intelligent/autonomous vehicles; Safe maneuvering; Safety guarantees; Control architecture, Motion planning; Risk assessment and management; Long-term autonomy; Safe connected and cooperative vehicles; Model-based approaches; Data-driven approaches; Safety in ADAS.

Control Architecture for Autonomous Vehicles

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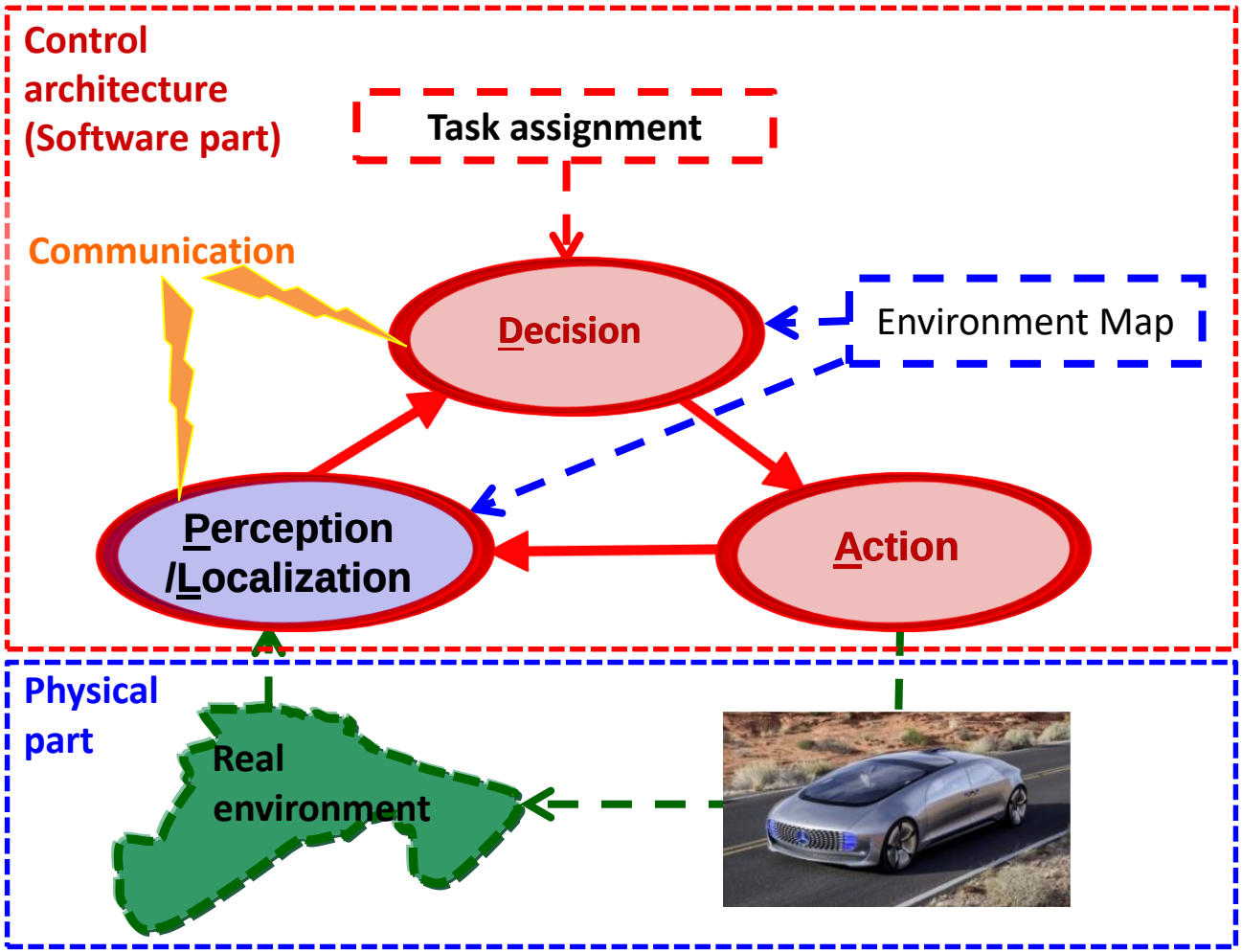
→ **Complex Interactive Tryptic: Close interaction between P/L-D-A**



- ✓ Modelling
- ✓ Perception
- ✓ Localization
- ✓ Communication
- ✓ Planning
- ✓ Control
- ✓ Decision making
- ✓ …

SIAV-FM2L main motivations

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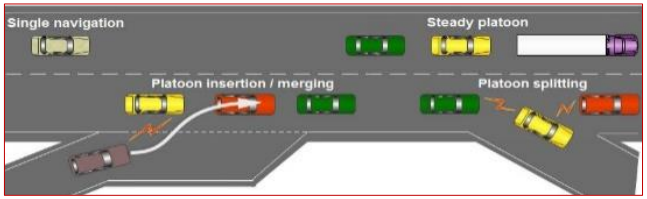

How to ensure Safety and Long-Term Autonomy of AV in any situation/environment?

Formal Approach

Machine Learning Approach

- ✓ Formal proves
- ✓ Appropriate de deal with high complexity

- ➢ Discussion about each of these approaches
- ➢ Try to construct bridges between them in order to have *efficient*, *complementary* and *generic way* to mix between them
- ➢ Appropriate control architectures
- ➢ Reliable techniques for Risk Assessment and Management
- ➢ …

Program

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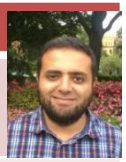
6 Talks: 4 Keynote speakers and 2 short talks

- Keynote talk: 30 min (24 min presentation, 6 min questions)
- Short talk: 20 min (16 min presentation, 4 min questions)

08:00 - 08:10	**Welcome & Introduction**
08:10 - 08:40	**Amr Alanwar**, Assistant Professor, Technical University of Munich (TUM), Germany ***Data-Driven Safety Verification Using Reachability Analysis***
08:40- 09:00	**Zhongqiang Ren**, Assistant Professor, Shanghai Jiao Tong University, China ***Multi-Objective Path Planning for Safe Navigation***
09:00 - 09:30	**Lounis Adouane**, Full Professor, Université de Technologie de Compiègne, France ***Resilient and Trustable Control Architecture for Autonomous Navigation in Complex Environments/Situations***
09:30 - 10:00	**Argyrios Zolotas**, Full Professor, Cranfield University, United Kingdom ***On control engineering, reliability and smart infrastructure enabling safer autonomous vehicle operation***
10:00 - 10:30	**Coffee Break**
10:30 - 1:00	**Umar Zakir Abdul Hamid**, PhD, Head of Global Product, International Business and Market Entry Strategy, PROTON - Part of GEELY Group, Malaysia ***Bridging R&D and Market Needs: Identifying Key Commercializable Gaps for Safer Autonomous and Software-Defined Electric Vehicles***
11:00 - 11:20	**Jiyeon Bae**, Researcher, Mobility Platform Research Center, Korea Electronics Technology Institute (KETI), Republic of Korea ***Navigating Continuous Space: ODD Exit Monitoring in Urban Environments***
11:20 - 12:00	**Open-ended discussions & Closing Remarks**






Many thanks for your participation!