Addressing Equity, Accessibility, Inclusivity and Acceptance in the Development of new Architectures for Automated Vehicles in UNICARagil

Orlando, July 16, 2019
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Challenges regarding Equity, Accessibility, Inclusivity in public and private vehicles

- Today’s vehicles mostly designed for the majority of the adult population
- People may not be able or allowed to use a car on their own for various reasons
  - Children, elderly and disabled people
- For private automated vehicles, requirements need to be defined \([1]\)
- For public transport in Europe, there is a directive for vehicles with a capacity of 8 occupants or more \([2]\)
  - Smaller vehicles (taxi, small shuttles) are not included

  ➔ Until 2022, full accessibility for local public passenger transport in Germany is to be achieved \([3]\)
Equity, Accessibility, Inclusivity and Acceptance

- The main project focus is the technological approach on modular architectures for agile, automated vehicles [4]

- However, these topics are addressed in the different use cases developed in the project
  - Acceptance and trust on automated vehicles
  - Equity, accessibility, inclusivity in private and public transport
OVERALL SYSTEM

Control-Room
- Remote vehicle operation
- Service center, e.g. for emergencies or sovereign interventions

Cloud Functionality
- Additional information for automated driving function
- Collective environment model
- Collective traffic memory

Four Fully Automated and Driverless Vehicles Enabled by Modular Information Processing
- Service-oriented SW architecture allows updates and additions to secure modules
- Vehicle fully functional without external information

Driving-Platform with Dynamic-Modules
- Modular structure consisting of 4 dynamic modules, energy module, brain stem + self-awareness
- Scalable, different vehicle sizes can be displayed
- Electric (48 Volt) and functionally safe

Intelligent Infrastructure
- Minimal stationary sensors
- Dynamic supplement through sensor cluster = drones

Sensor-Modules
- Identical integration for all vehicle variants
- Fail-operational due to 3 physical sensor principles
- Provides environment information as a service

Source: [4]
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Acceptance and trust on automated vehicles

Gain trust of other traffic participants via interieur, exterior and motion HMI

Active/direct communication
- Displays
- Lights / LEDs
- Gestures

Passive/implicit communication
- Velocity and distance
- Acceleration
- Pitch

Behavior of automated vehicles needs to be predictable to other traffic participants and occupants of the vehicle
• Supplementing the public transport system
• 6 – 8 persons
• Moves and behaves like a rail vehicle

**auto SHUTTLE**

• Acceptance and trust by exterior and interior HMI
• Inclusive, equitably and accessible
- Acceptance and trust by exterior HMI
- Accessibility for all people
- Pick up and delivery service
- Automated handover
- Dense storage system
• Taxi-service
• Order, open, interact with CE device
• Cooperative and agile ...

• Acceptance and trust by exterior and interior HMI
• Private „Butler / Nanny”
• Carrying out private trips to school, sports ...
• Private and individual
• Accessible, inclusive and trustworthy

• Inclusive, equitable and accessible for all family members

auto ELF

Summary

**auto SHUTTLE**
- acceptance and trust by exterior and interior HMI
- Inclusive, equitably and accessible

**auto TAXI**
- acceptance and trust by exterior and interior HMI

**auto CARGO**
- acceptance and trust by exterior HMI
- accessibility for all people

**auto ELF**
- Inclusive
- equitably
- accessible for all family members

Be ready for an equitable and trustworthy future mobility!

July 16, 2019
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[www.unicaragil.de](http://www.unicaragil.de)

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UNICARagil halftime event

March 24 2020, Munich Germany

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UNICARagil - Automated Vehicles Symposium 2019
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