10th AUTOSAR Open Conference

Accelerating Auto Industry Innovation, with Safety and Scalability

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Why trust matters

“The majority of U.S. drivers seek autonomous technologies in their next vehicle, but continue to fear the fully self-driving car.”

“Psychology research shows people mistrust those who make moral decisions by calculating costs and benefits – like computers do”

March 7, 2017 “Americans Feel Unsafe Sharing the Road with Fully Self-Driving Cars”

75% “of U.S. drivers report feeling afraid to ride in a self-driving car.”

April 24, 2017 “Why are we reluctant to trust robots?”
What do we mean by “trust?”

“Firm belief in the character, strength, or truth of someone or something.”

– Source: Merriam-Webster Dictionary Online
study format: qualitative

- User studies were conducted in a **fully-functional autonomous vehicle**.
- **10 participants** – men and women, variety of ages and backgrounds represented.
- 7 areas of tension identified; opportunities to be addressed through the **human-machine interface**.
- Tensions help us **understand system architecture implications and define technical requirements** for our autonomous driving solutions.
- **Key learnings will be shared** with our automated driving partners and incorporated into Intel technologies.
Contradictions = tension

Participants expressed contradictory viewpoints in 7 key areas:

1. Human vs. Machine judgment
2. Personalized space vs. Lack of assistance
3. Make me aware vs. Unburden me from being aware
4. Giving up control of the vehicle vs. Gaining new control of the vehicle
5. How it works vs. Proof it works
6. Tell me vs. Listen to me
7. Following the rules vs. Human interpretation of the rules
So how do you prove that AV’s are trustworthy?
A Vision for Defining “Safe” with Certainty

- We must **prove** to consumers that AVs are far better than human drivers.
- When AVs **are** in accidents with human-driven vehicles, society will demand immediate assignment of fault.
- Data-driven methods (driving 30 billion miles) don’t scale if you have to repeat data collection when software changes.

Absolute safety is impossible—but we can define a world in which machines are never at fault.
Responsibility-Sensitive Safety (RSS) is a commercially viable vision to help ensure safety and trust:

- Mathematical model to set the rules of “blame” in advance
- Concept of “safe state” in which the AV cannot cause an accident of its blame, regardless of what other agents do
- Can be translated into insurance policies and driving laws

Safe Distance Formula

- Response time of the AV
- Road conditions (wet, dry…)
- Velocities of both vehicles
- Max deceleration

Driving at 100kmh with $\Delta v = 0$, $p = 200ms \Rightarrow d = 5.5m$

Driving at 100kmh with $\Delta v = 50kmh$, $p = 200ms \Rightarrow d = 33m$
Opportunities for AUTOSAR

Are the right partners at the table to help AUTOSAR through the transition to autonomous driving?

Are we doing enough to harness the power of complex heterogeneous high performance compute systems?

What role does AUTOSAR play in the conveyance of safety or the establishment of Trust?