Shared Automation Operating Models for Worldwide Adoption

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Artificial Intelligence for Road Safety and Mobility Workshop

8th UN Global Road Safety Week

Athens, 15 May 2025

DECADE OF ACTION FOR ROAD SAFETY 2021 - 2030

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The SHOW project

- **SHOW**:

  "SHared automation Operating models for Worldwide adoption"
  show-project.eu

- **Partners:**

  66 project partners from 13 EU-countries, involving:
  National Technical University of Athens

- **Duration of the project**:

  48 months (January 2020 - September 2024)

- **Framework program**:

  Horizon 2020 - The EU Union Framework Programme for Research and Innovation - Mobility for Growth
  (Grant agreement No 875530)

4+ years

66 partners

13 European Countries

Over **20** cities involved across Europe

Co-funded by the European Union

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Objectives

- The SHOW project aimed at developing shared automation operating models for worldwide adoption.
- The project vision was to investigate the integration of AVs into various transport schemes.
- SHOW conducted large-scale trials across 21 cities, transporting over 150,000 passengers and completing more than 5,000 cargo deliveries.

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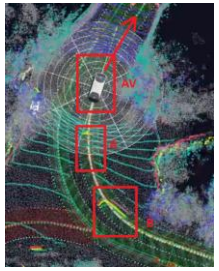
Impact on Safety

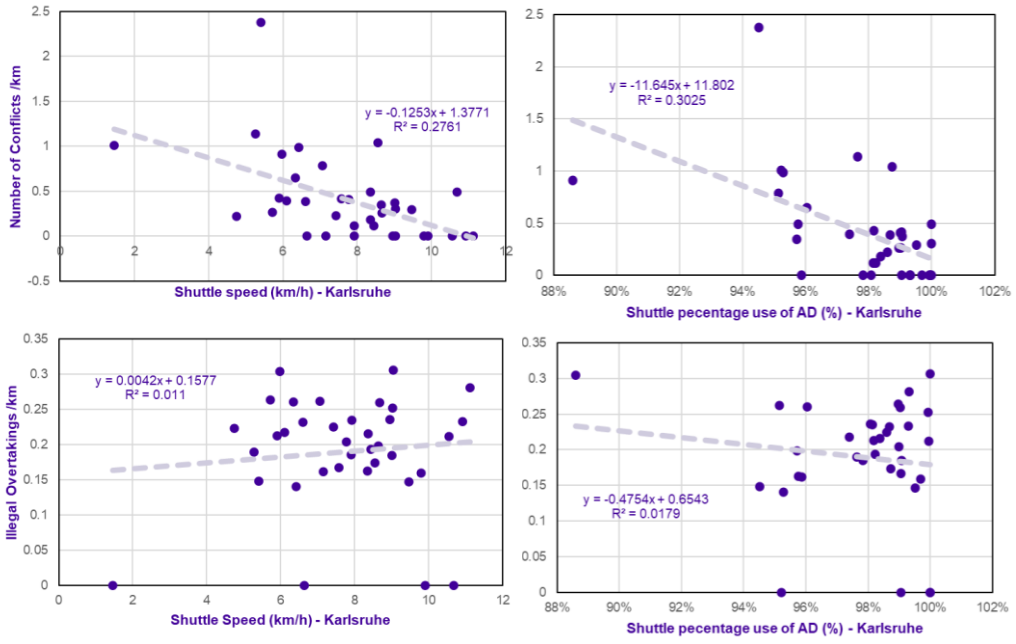


Crash with NAVYA N°P146

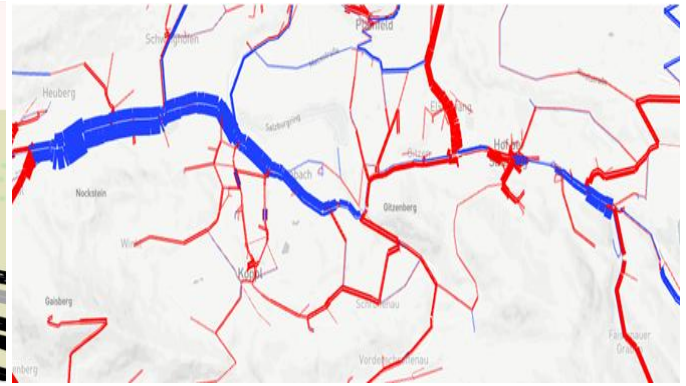
in Crest, France
August 2nd 2024

- Ten minor crashes occurred, primarily due to human driver errors during interactions in challenging areas (e.g., bus stops), rather than AV system failures.
- Conflicts and illegal overtaking incidents were correlated with traffic KPIs (e.g. speed).
- Higher speeds and acceleration variance are linked to fewer conflicts, indicating better quicker adaptation to traffic flow.

Site	Number of crashes	Cause	Manual or AD
Linköping, Sweden	2	Collisions with bus and truck near bus station	AD
Karlsruhe, Germany	1	Collision with car exiting a parking space	AD
Salzburg, Austria	1	Steered into oncoming lane	AD
Crest, France	1	Failed overtaking maneuver by another car	AD
Tampere & Kuopio, Finland	3	Early departure from stop, overtaking-related crash, sudden stop due to conditions	Manual & AD
Klagenfurt, Austria	2	Reversing car and lawn tractor collision	AD



Simulations Supporting Pilots



Simulation tools used: VISSIM, New Mobility Modeller, Urban Strategy, SIL Simulator, ROS, Autoware Sim, SUMO, Menge, CARLA, Gazebo, AIMSUM, SSAM, ANY LOGIC, TRANSCAD, MATSim, AVSS

Vulnerable Road Users (VRUs) level

- Ensure a higher level of detail.
- Manage interactions at bus stops.

Street level

- Applied on pilot site level.
- Examine interactions between different road user types.
- Examine AV-logic and safety issues.

City level

- Provide region or city-wide results.
- Examine Demand-Responsive Transport (DRT) applications.
- Address modal split changes.

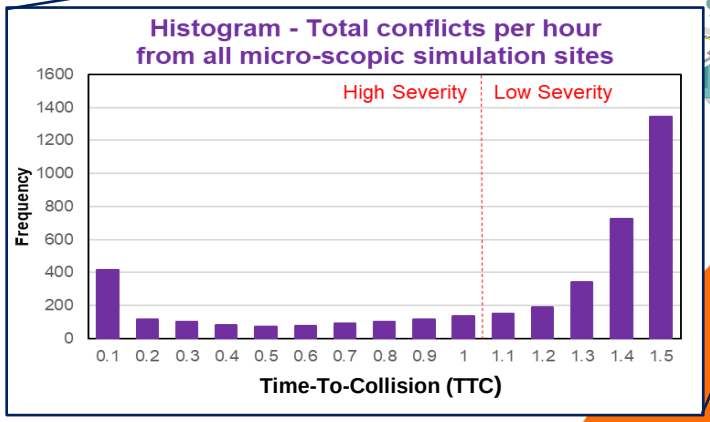
Impact on Simulated Conflicts

- Conflicts were identified by analyzing **trajectory data** from simulations.
- Time-To-Collision (TTC) was categorized to assess **conflict severity**.
- The introduction of automated shuttles **reduced the likelihood of severe conflicts** for all vehicle types.
- Automation **increased TTC**, providing more time before potential collisions.

	Estimate	Std. Error	t value	Pr(>|t|)	
(Intercept)	-0.663	0.051	-13.014	<2e-16	***
Scenario (without or with AVs)	-0.099	0.020	-5.051	4.39e-07	***
MaxDeltaV	0.292	0.005	54.697	<2e-16	***
MaxD	-0.026	0.001	-19.54	<2e-16	***
Conflict Type: Lane Change (Ref: crossing)	-0.270	0.050	-5.43	5.64e-08	***
Conflict Type: Rear End (Ref: crossing)	-0.837	0.046	-18.117	<2e-16	***

Dependent variable: Conflict Severity (0 for low severity and 1 for high severity)
*Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1*
Null deviance: 78733 on 62141 degrees of freedom
Residual deviance: 68154 on 62136 degrees of freedom
AIC: 68166

Simulation Sites



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SHOW-Specific Policy Support Tool (PST)

- Originally developed in the LEVITATE project, the PST was adapted to assess impacts of autonomous shuttles in real-world urban settings.
- Updates included city-specific data presets, interactive guidance and a simplified interface based on stakeholder feedback.
- The SHOW-PST supports cities in integrating automation into mobility strategies.

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- All road users benefit as AVs reduce severe conflicts through cautious driving and lower speeds.
- Drivers face fewer high-risk situations, while they need to adapt to AV behavior, especially during unscheduled stops.
- Urban transport authorities can use these findings to guide safe speed management and AV integration.

Scientific and Social Impact

- Reduction in overall traffic conflicts supports safer, more automated mobility systems.
- Scientific insights show AVs shift risks from severe to low-severity incidents.
- Encourage development of smarter, adaptive AV technologies and urban policies.

Future Challenges

- Manage AV speed profiles to reduce risky interactions.
- Improve AV response and communication with human-driven vehicles.
- Develop well-defined and concrete automation strategies for a wider social adoption and road safety enhancement.

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