



## Real world demonstrations

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## 1. Executive Summary

July 8<sup>th</sup> and 9<sup>th</sup>, the final event of the HEIDI project took place at Innoport in Reutlingen, Germany with the activities of July 9<sup>th</sup> open to the public. As part of this event, the real-world prototypes, integrated in test vehicles were presented to the public.

This report summarizes the proceedings of the real-world Demonstrations which constitute deliverable 7.4 of the HEIDI project.

**Keywords:** eHMI, iHMI, final event, real world demonstrations

## 2. Demonstration activities

The demonstrations of HEIDI results to the public were divided into several parts. An introduction was given at Innoport Reutlingen as part of the presentations given. The exterior HMI prototype, realized by MAR, was presented inside the AIDA Hall and the interior HMI prototype, realized by BMW and NISYS, was presented in the open space outside of AIDA Hall.

Participants interested in the real world demonstrations were separated into two groups of approximately 20 people. Group A first visited the eHMI demonstration and then the iHMI demonstration, group B vice versa.

### 2.1 Posters

In order to appreciate the full context of the real world prototypes, a poster session was prepared at the Innoport presentation room, see Figure 2–1. Members of the consortium presented and explained the experimental setups, investigations, and results.



Figure 2–1: Poster Session at Innoport.

### 2.2 Demo of the HEIDI display on the dynamic vehicle in the AIDA hall

Inside the AIDA hall, a blocked-off area for spectators was prepared to ensure safety for the first part of the demonstration which included a dynamic presentation of the test vehicle, see Figure 2–2.

A key part of the demonstration was a short reenactment of the scenarios investigated in Study 10 – as detailed in deliverable 7.1 - which was the core achievement relating to eHMI. The audience had the perspective of a waiting pedestrian from the right side and could observe the interaction of a pedestrian with the approaching vehicle.

A moderator explained the content and processes of the study with a monitor in the spectator area showing the Motion Capturing images live, Figure 2–3 and Figure 2–4.

After an introduction, explaining the display properties and messages to the audience while the vehicle was stationary, the dynamic test began, see Figure 2–5 and Figure 2–6. A pedestrian interacted several times with the test vehicle with and without the eHMI active.

Thus, the effect and usefulness of an eHMI for vehicle-VRU communication could be made quite apparent.

Then, the vehicle was positioned at a distance to the audience and a stationary demo of various eHMI parameters was performed:

- Change of luminance for day (sunny, cloudy) and night modes
- Various sizes of HEIDI symbols, including a minimum resolution & size.
- Other useful use cases with the display (ADAS light, customization, dynamics, color code to further improve HEIDI messages, including welcome home).

Finally, the audience was invited to leave the cordoned-off area and approach the stationary vehicle, Figure 2–7. The moderator and experts from the HEIDI consortium were available for questions.



Figure 2–2: Cordoned-off area for the public inside AIDA hall.



Figure 2-3: Moderator explains the demonstrations.

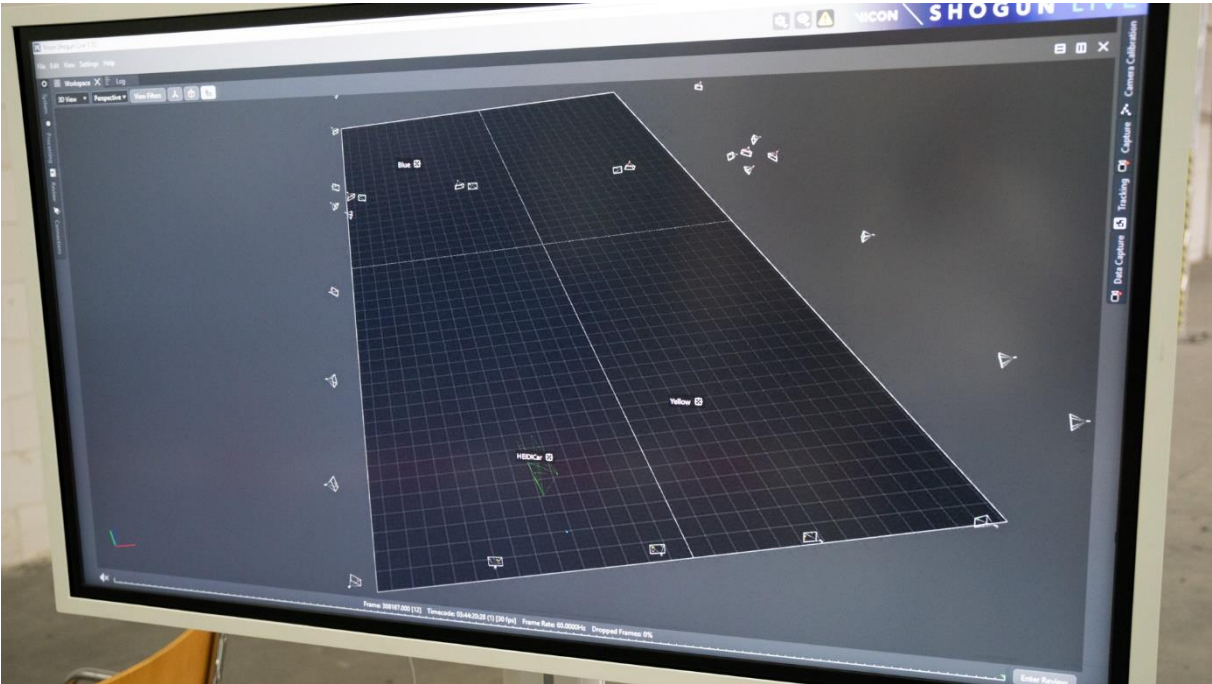


Figure 2-4: Live images from the motion capture system at AIDA hall.



Figure 2-5: Live demonstration of pedestrian vehicle interaction.



Figure 2-6: Live demonstration of pedestrian vehicle interaction.



Figure 2–7: Public audience with the test vehicle.

### 2.3 Demo of the "interior" prototype outside in the parking lot in front of the AIDA hall

Outside the AIDA hall, a cordoned-off area was set up for spectators to ensure safety during the first part of the demonstration, which included a dynamic presentation of the test vehicle (Figure 2–8 to Figure 2–13).

An important part of the demonstration was a brief reenactment of the scenarios examined in Study 8—as described in detail in Deliverable 7.1—which represented the central achievement in connection with iHMI. The audience had the perspective of a waiting pedestrian on the right-hand side and could observe the interaction of a pedestrian (the presenter took on this role) with the approaching vehicle.

The presenter explained the content and procedure of the study to the audience, while up to three guests could take a seat in the car. One person was able to drive the demo vehicle, while another moderator monitored the demo from the passenger seat.

After an introduction explaining the display features and messages to the audience while the vehicle was stationary, the dynamic test began, see Figure 2–8 and Figure 2–9. A pedestrian (presenter) interacted with the test vehicle several times, both with and without active iHMI. This demonstrated the effect and benefits of iHMI for the driver and passengers.

The vehicle was then positioned at a distance from the audience and a stationary demonstration of various iHMI parameters was carried out:

- Change of symbol
- Change of distraction tasks
- Experiencing the escalation scenarios with sound

Finally, the audience was invited to leave the cordoned-off area and approach the stationary vehicle in the AIDA hall after the demo drives, see Figure 2–12. The moderator and experts from the HEIDI consortium were available for questions.



Figure 2–8: iX democar rolling towards the moderator.



Figure 2–9: iX democar stopping at the yellow marking next to the moderator



Figure 2–10: iHMI system first distracts the driver and alerts the driver, if necessary



Figure 2–11: a new group entered the vehicle



Figure 2–12: iX democar inside AIDA Hall for open access.



Figure 2–13: iX democar inside view.

## 2.4 Final Event

The HEIDI Final Event, as described in the previous sections, showcased the project's key outcomes through a series of real-world demonstrations, providing tangible proof of concept for the developed innovations, enabling stakeholders to experience the technologies in realistic scenarios. The event attracted a wide range of external participants, including industry professionals, university professors, students, and representatives from national television and politics. The presence of multiple media outlets resulted in extensive press coverage and follow-up articles, significantly increasing the dissemination of the project's results beyond the

consortium. These demonstrations and the strong external interest highlighted both the technological maturity and societal relevance of the HEIDI outcomes.



Figure 2–14: Final Event closure photograph.

### 3. Conclusion

The HEIDI Final Event successfully showcased the project's main results through real-world demonstrations of eHMI and iHMI. The prototypes convincingly illustrated their functionality and benefits in realistic scenarios, attracting strong interest from industry, academia, policymakers, and the public.

These demonstrations not only highlighted the technological maturity of the solutions but also showed their societal relevance, ensuring broad visibility and impact beyond the consortium.

## 4. Abbreviations

| Term      | Definition   |
|-----------|--|
| ADAS      | Advanced Driver Assistance Systems                                       |
| AIDA hall | Artificial Intelligence Data-Incubation Center                           |
| DEM       | Demonstrator, Pilot, Prototype   |
| eHMI      | External Human-Machine Interface   |
| HEIDI     | Holistic and adaptive Interface Design for human-technology Interactions |
| HMI       | Human-Machine Interface  |
| iHMI      | Internal Human-Machine Interface   |
| PU        | Public   |
| VRU       | Vulnerable Road User   |