



PUSH Conference Blog: UX in cars. A status report.

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As technology advances, digital transformation is increasingly changing the automotive industry and user experience in the car.

When people buy a car, they are not only concerned about speed, fancy interior and exterior anymore, but also about digital services that come with the car. The car as a status symbol and something one owns gets less important.

The existence of smartphones has revolutionized our lives and our expectations of digital services. We can use it for almost everything: work, entertainment, payment, etc. So, people expect the same experience in their cars as they do from their smartphones – efficient, intuitive and smart.

Where are we today?

Nowadays, many haptic elements in the car have been replaced by big screens. OEMs (car manufacturers) have launched their own mobile apps for connecting their vehicles and in-car systems. But has user experience really improved? Although the screen has become larger and more functional, sometimes menus are too layered and frequently used tasks are not easy to access. Cognitive load is too much in many cases. This can cause distraction while driving. We really need to think of various contents and different touchpoints during the entire driving process. In-car user experience cannot be as simple as just putting all the functions on one screen.

Safety's first

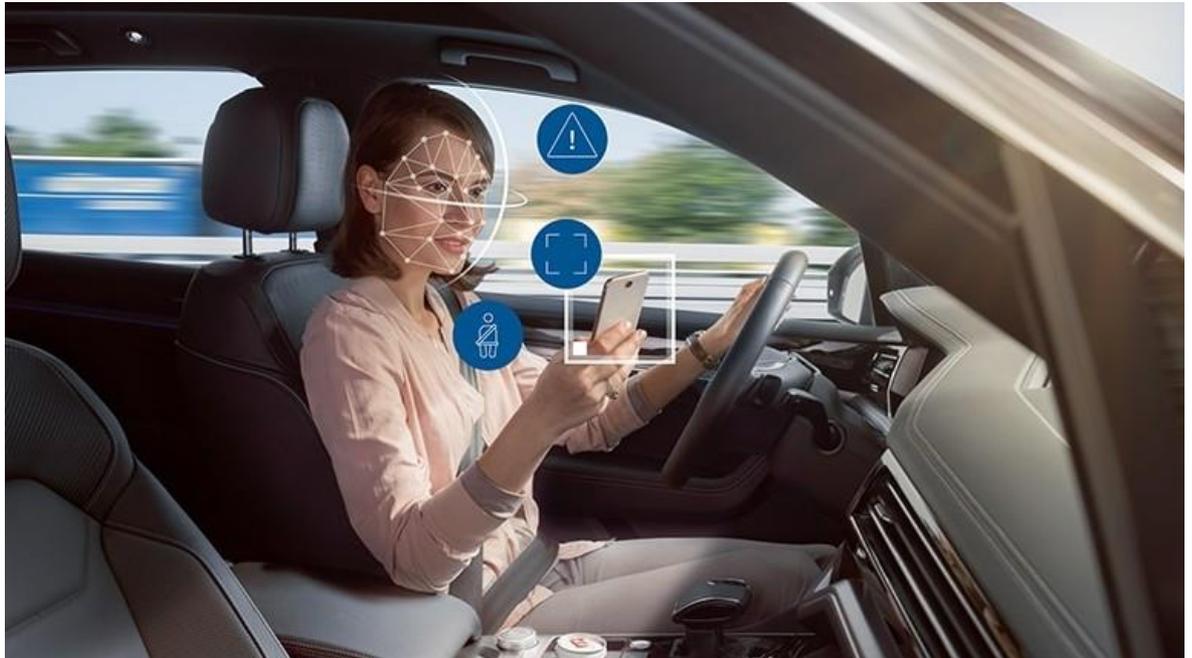


When you get into a car, the most basic need is that you can drive safely to your destination. As long as cars are not fully autonomous – and this will surely still take quite some time - more than big screens and diverse entertainment features, security is still the most important issue.

In-car environment is special. The driver only can concentrate on the screen for a short time and only got one hand free. This requires that the information on the screen is not distracting the driver. The system must clearly present the information which drivers needs most.

It is also smart to deliver the information based on context. Just to give some simple examples: morning commuters are concerned about information on traffic conditions like blocked roads, because they need to be at work in time. On the way to a family trip on the weekend, users may need information about the weather or activities around their destination. With access to real-time data these services can exactly be designed around user's needs.

There are already many technologies that can help us drive safely. The Driver Alert System in Volkswagen has a steering wheel sensor. It can detect steering wheel movements and lane deviations to determine whether the driver is distracted. When unusual behavior is measured, a message will pop up on the dashboard to ask drivers whether they want to have a cup of coffee (which opens up the door for business needs and integration of third parties, by the way). In addition to analyzing the driver's steering behavior, the Bosch monitoring system, for example, provides more comprehensive detections using face recognition. It detects the situation when drivers' eyelids are getting heavy or when they turn their head towards another passenger.



Bosch Interior monitoring system (source: [Bosch](#))

In addition to in-car systems, increasing the alertness of people themselves for a safe drive is a more fundamental approach. The behavior of drivers can be analyzed by collecting data in vehicles. It helps to identify risky driving behaviors, such as harsh acceleration or braking. Combined with services such as linking driving behaviors to insurance, drivers with good driving behaviors can get a discount on their insurance fees. This can motivate people to drive even more safely.

Seamless journey

Connected data opens many possibilities to create a seamless journey for the user.

For example, the BMW digital key can be used to unlock the car using a mobile phone. You can even unlock the car without your phone, for example with fingerprint. Then you could use face recognition to start the car, log in to your profile and use your personalized in-car settings and services. For Audi we've integrated the Vehicle-2-Infrastructure service 'Traffic Light Information' which anticipates traffic light changes. These predictions are used to calculate and recommend the optimal driving speed so you always catch a green light and thus save resources.



BMW Digital Key (source: [BMW](#))

Hyundai Smart Fingerprint (source: [Hyundai](#))



Audi Traffic Light Information (Foto: Audi)

Coherence

Besides car based functions-on-demand, there is a variety of smart connected services which can make the driver's journey more efficient.



Imagine planning your trip on your phone and when entering your car your destination already is set in your navigation system. Having a cross-device user profile can make your infotainment system an additional device in your personal ecosystem.

Using data to recommend Points of Interest (POIs) is a business model already and will be even more so in the future. During your journey, in-car payment services can enable you to pay for fueling or parking directly from the car. No cash or card needed. You can even order and pay for food in the system and pick it up without having to wait. It's important to create a seamless user experience, including how users only need to log in once to pay at different merchants, and how easy the interface needs to be to use.

Personalization

Our vehicles have become much more than a transport medium. The connected vehicle ecosystem is now transforming the driving experience. The demand for personalization of in-car systems is also increasing. A smart in-vehicle system needs to take into account the habits of each passenger and be able to adapt to different environmental changes.

Based on the number of people and the lighting conditions, air volume, steering wheel heating, seat heating as well as seat ventilation etc. could be adjusted automatically.

Mind the mates

Screens are no longer exclusive to the driver either. More and more all-in-one screens and rear seat screens are appearing, making it possible for everyone in the car to have individual information and entertainment. Just think of the different infotainment preferences of a young family being in the car together: traffic information on the driver's seat, browsing on the passenger's seat and kid's entertainment in the back seat.

For example, Porsche presents VR entertainment for the back seat with integrating *Holoride*. The VR headset is paired to the vehicle so that its content can be adapted to the car's driving movements in real time.



VR Entertainment from Porsche with Holoride (source: [Porsche](#))

Multi-modal interaction

Screen interaction is still dominating. In many cases, it's the most efficient way of accessing information. So, it is important that the information in the interface is clear and accessible. The use of multiple interaction methods can also help people to drive better:

Voice assistant is becoming widely used today. Every OEM tends to develop its own personal assistance. Besides Alexa, Siri can also be integrated into the HMI. One of our projects is that we implemented Alexa functions into the Audi e-tron. Together with Audi, Amazon, e. solutions and Elektrobit, we ensure a seamless integration of Audible, Kindle, Amazon Music & Co - as well as smooth interaction between voice recognition, media playback, playlist management and user experience.



Integration Amazon Alexa for Audi e-tron (Foto: Audi)

The technology for **gesture recognition** is constantly developing, such as Google Soli for real-time motion tracking of the human hand. But gesture control is still rarely used in cars. One of the difficulties is how to define gestures that are natural for everyone. Especially since not every culture understands all gestures in the same way. Another issue that needs to be addressed is the reduction of misjudgments of gestures, e.g. avoiding people's movements in car accidentally triggering certain functions.

The future is here. Almost.

Autonomous driving: talked about a lot. Still not there. This will be a long road to travel still. But cars will get more autonomous, mobility will be less about driving itself but about how to use the time on the road differently.

Shared mobility: mostly the younger generation already are performing a switch from owning a car themselves to just quickly renting when they need one. In general, the variety of vehicles is heavily increasing, making it possible to even travel the last mile seamlessly. E-scooters, e-motorcycles or e-bikes are filling the gap.



Connected cars: the more vehicles are connected, the more data will be available and the better connected services will evolve. Which leads to more efficiency, safety and sustainability.