

The Dynamic Human Vehicle Relationship through Robotic Interaction Systems

An exploratory look into how robots can add value to the interaction with fully autonomous vehicles.

With the imminent rise of vehicle automation the human driver will have increasingly less responsibility for driving. At one point this will even mean that cars will be able to fully drive themselves, so that the driver is relieved of all driving related tasks. In this situation the car effectively becomes a robot, resulting in a novel relationship between human and car. This project explored that relationship by looking at the possible overlap between autonomous vehicles and robotics. The aim was to develop a set of design principles that can help researchers and practitioners alike to ensure an AV future that is beneficial on the community level as much as the individual level.



AVs

The rise of autonomous driving technology means that users will be fully relieved of driving tasks, making way for a new way to enjoy mobility, especially with their community.

Robotics

In robotics we see a shift from functional applications to more social ones. The AV can be considered a robot, therefore we should also look at the AV in a more social setting, where it fulfils a facilitatory role.

Co-Creation Workshops

To gain user insights a co-creation workshop was conducted. In these workshops the participants were all part of a certain community, and their task was to envision how a 'shared mobile space' (an abstract term used in substitution of AV) and robotics could add value to their lives. The key findings were:

Renaming the AV a 'shared mobile space' helped the participants **step away from car-focused use cases**. Additionally, the word 'car' was only mentioned once.

The shared mobile space was seen as a **problem solver**. The participants looked at what their community was missing, and then ideated on how the space could solve that problem.

Robotic technology was seen by the participants as a **facilitator**; as a sort of helper that could perform tasks they would not or could not perform, to make their lives more enjoyable.

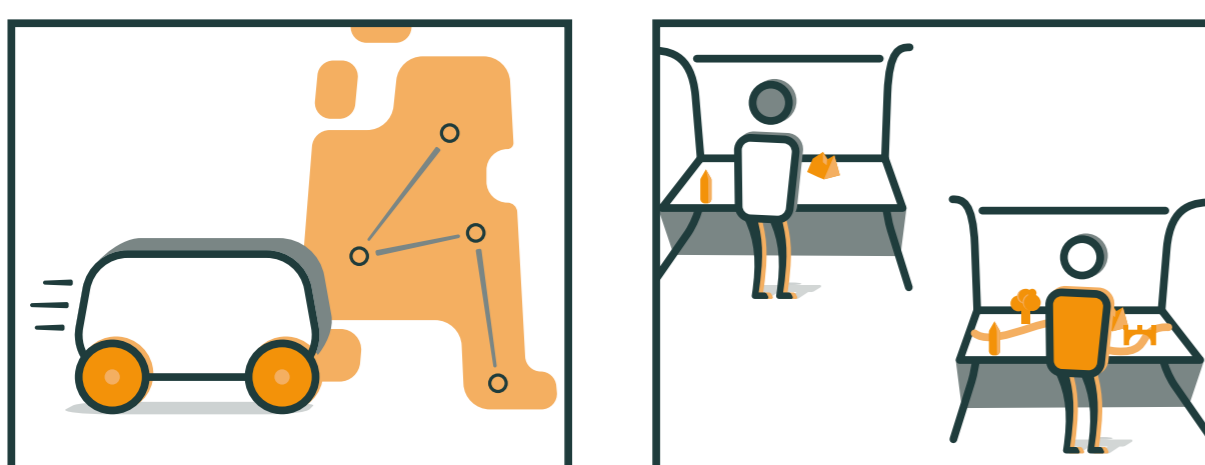
AVs should be considered 'shared mobile spaces' rather than 'self-driving cars'

When envisioning or designing for a future technology that is as disruptive as AVs, we have to be mindful of the **mental boundaries** that humans have. Even though the AV is an evolution of the current-day automobile, the AV's robotic aspect means that its use case can be **much more than an evolution of the automobile's use case**. To reflect this, designers and researchers should not regard AVs as self-driving cars, rather as **shared mobile spaces**. This terminology and mindset better reflects the use and **experiential opportunities** that AVs present. In this case 'shared' doesn't necessarily refer to ownership of the vehicle, rather it is aimed to reflect that it is something that can be **used and enjoyed by multiple people**. The current individualistic perspective on vehicles will be challenged by future AVs because of the leisurely opportunities they present. Because of its mobile and shared character, an AV can bring people from a community together, and generate a **shared experience** for them.

To fully unlock the value that an AV can have as a shared mobile space, the following design principles should be taken into account.

Nonsimultaneously Connected

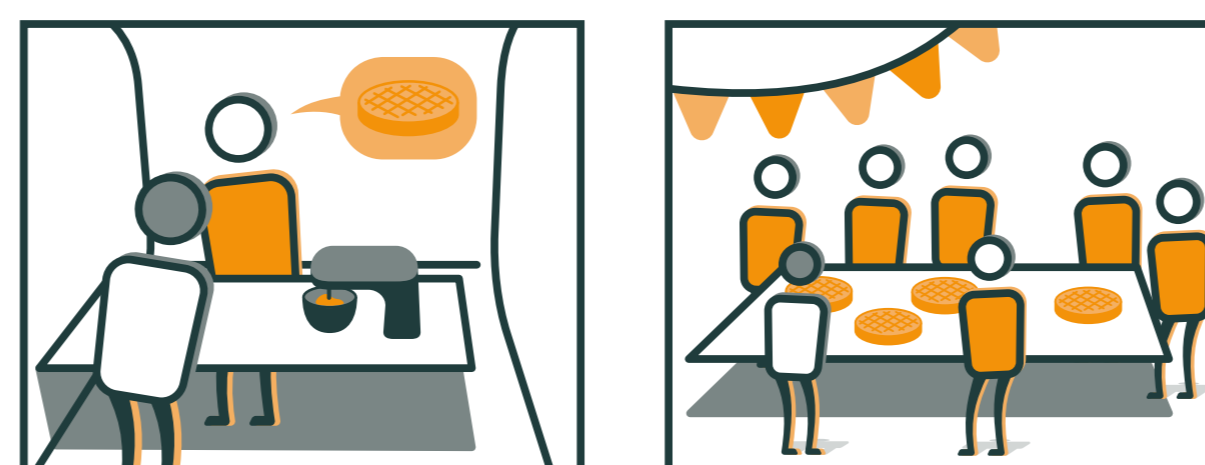
AVs provide opportunities for interest-based communities to be **nonsimultaneously connected** in a physical space.



Communities are groups of people that are connected through commonality on some level. Often this commonality is a shared physical space that is location based, like a city or neighbourhood. Communities that have a different type of commonality like a shared hobby or activity, often don't have this shared physical space. Because we regard an AV to be a shared mobile space, it is able to provide extra value to those communities by adding an extra layer of interaction that they didn't have before. This can help elevate the community's feeling of togetherness and add an extra dimension of experience.

Tailored

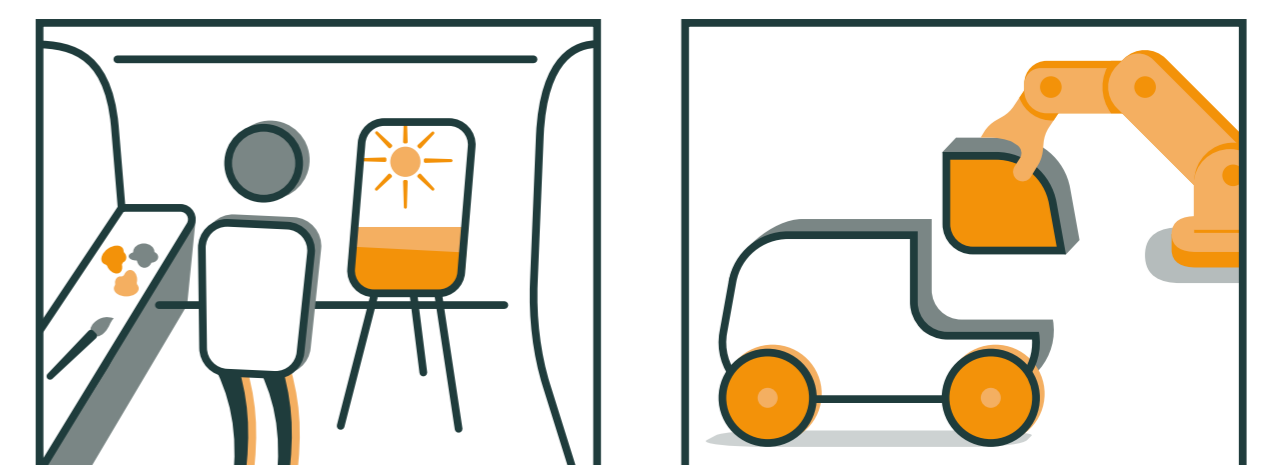
Tailored NDRAs should be used to catalyse community inclusion.



For an AV to fully create meaning to a community, it should also fully use its core characteristics. A large part of what makes an AV an AV is that it's possible for users to engage in NDRAs. Because the AV is a shared mobile space, the possible options for NDRAs are virtually endless. This means that each user can be able to perform a specific activity that is tailored especially to them and their goals. If we take this goal as community inclusion, we should then also tailor the NDRAs very specifically to reach this goal. So, instead of bringing people together in the AV and leaving their activity and connection up to chance, a targeted NDRA should be used to accommodate the users' wishes, needs, shortcomings and strengths.

Adaptable

Adaptability should be a core characteristic of an AV, therefore also of its design process.



The touching point of AVs and robotics can be in the role that they fulfil towards humans; as they are both helpers or facilitators that autonomously accommodate humans' needs. There is however another, perhaps more technical, touching point. We see that an AV should be a tailored and targeted environment for the users. This means on the one hand that it should feel like such an environment, but it also means that the physical space should accommodate this as well. As different use scenarios would require different physical layouts or setups, the AV should be able to adapt itself to each variation. Looking at the core characteristics of robotics in the traditional sense, it seems that this technology can be perfectly used to achieve the desired adaptability. After all, the AV should know or sense what use scenario it should adapt to, and then autonomously perform this physical adaptation.

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