



# Cinematic Analysis of Automotive Personalization

**Christoph Endres**  
German Research Center  
for Artificial Intelligence  
Building D3<sub>2</sub>, Campus  
Saarbrücken, Germany  
christoph.endres@dfki.de

**Tim Schwartz**  
Cluster of Excellence M<sup>2</sup>CI  
Building E1<sub>1</sub>, Campus  
Saarland University,  
Saarbrücken, Germany  
schwartz@cs.uni-saarland.de

**Michael Feld**  
German Research Center  
for Artificial Intelligence  
Building D3<sub>2</sub>, Campus  
Saarbrücken, Germany  
michael.feld@dfki.de

**Christian Müller**  
German Research Center  
for Artificial Intelligence  
Building D3<sub>2</sub>, Campus  
Saarbrücken, Germany  
christian.mueller@dfki.de

## ABSTRACT

Personalization has become an important aspect in the design of cars and the Human-Machine Interface (HMI). Successful personalization bears the potential of increasing both safety as well as customer satisfaction. In order to reveal innovative concepts in automotive personalization, we present in this paper a cinematic study – an analysis of what the movie industry “invented” and what might be worthwhile following up upon in research. Thereby, our notion of personalization is twofold: a) tailoring the car or parts of the car to a specific user (group) and b) the car or parts of the car becoming a persona – the latter being relevant with respect to current automotive research activities on the “emotional” car. Based on the analysis of popular movies and TV series from the last four decades, we introduce a scheme that describes personalization concepts as imagined (and maybe even anticipated) by film-makers, whose creative drives have not been slowed down by the restraints of feasibility and costs.

## ACM Classification Keywords

H.5.2 Information interfaces and presentation: User Interfaces, User-centered design

## Author Keywords

Automotive HMI, Personalization, Cinematic analysis

## INTRODUCTION

The role of cars in everyday life is changing. They are no longer just a means for transportation, but instead bring together features we have previously known only from other devices – communication and social networking functions,

information services, shopping applications, entertainment programs, and many more. This trend is largely driven by the generation of the so-called “digital natives”, who expect to be accompanied by connectivity and their regularly used online services – at home, in the office, in transit on foot or in the car. With the number of functions increasing, so is the complexity of the system and its usage. Adding to this the fact that the way people actually interact with a system depends very much on the individual, personalization plays a critical role in the design of the HMI (Human-Machine Interface) [3]. For example, elderly people are often more easily confused by an overwhelming amount of simultaneous information, while more details are helpful to other people. In the automotive context, the presentation is not only a matter of convenience, but has an immediate effect on the driver’s safety. Similarly, if the car has background knowledge about the driving style and behavior of the driver in various situations, it can anticipate potential dangers and adapt its output strategies to provide personalized assistance in problematic situations. Finally, a system that is more sensitive to the user’s needs will also make them more productive in general and provide a better overall service.

In [6], Schmitz et al. analyzed the mutual influence of popular motion pictures and Human Computer Interaction (HCI) design. In this paper we follow up on that idea and take a look at a more specialized area, i.e. the idea of personalization of car interfaces. The motivation to analyze movies is many-fold: Besides the obvious fact that it is a lot of fun of course, one of the main reasons is that movie-makers often do not care about the feasibility of their approaches, e.g. their creativity is not restricted by the need of a working technical implementation (a visual mock is usually sufficient). Moreover, the directors aim to produce easily graspable scenes, and often try to generate emotions through visual and auditory effects. All in all, instead of following the rather old guideline “form follows function”, they follow the “form follows emotion” paradigm, which was established by Prof. Hartmut Esslinger, the founder of *frog design inc.*, and which was successfully applied by Apple since the early eighties. Thus, movies are an excellent resource for finding intuitive, easy to understand and emotionally laden



Figure 1. The four meanings of personalization according to Jameson.

user interfaces.

The remainder of the paper is organized as follows: First we will shed some light on the term *personalization* and its different readings. We will then dig deeper into a selected set of movies and describe our findings with regards to personalization. The first findings are already technically feasible, but with each further movie, we will leave the grounds of reality more and more, until we will reach some, rather imaginative, ultimate convergence.

## PERSONALIZATION

While analyzing movies that contain interesting ideas for car interfaces, we realized that personalization seems to play an important role in these movies. According to the model introduced by [4], personalization can be seen as the union of three overlapping system properties: adaptability, adaptivity, and anthropomorphism. We extended this view on personalization by a fourth category: customization (see Figure 1).

### Customization or Tailored to the User

Customization means that an object or system is built or modified to fit the needs of one particular user or a particular user group. Usually such a customization is done by experts and needs great expertise and often enough heavy tools. Batman's car is an example of an automobile that was designed from scratch with the needs of the user in mind. James Bond's cars are examples for "off the shelf" cars that are modified to suit the special needs of the user. A further example for the latter case is the MTV series *Pimp My Ride*. An easy, practical example of customization is changing the color of a car's finish, which normally cannot be done by the user himself and is too time consuming and expensive to be done regularly.

### Adaptability

Adaptability describes a system's or object's ability to be adapted easily to the user by the user themselves. An easy example for this are the driver and passenger seats, which can be adjusted easily. Back to the example of changing the car's finish: think about some futuristic, high tech electronic material that can change its color. Given an easy to understand interface, a user could change their car's color every day (or even more often) to reflect their mood. The main difference to customization is thus, that little expert knowledge is needed to acquire personalization.

### Adaptivity

An adaptive system or object can trigger the adaptation by itself in a proactive manner. E.g., using the high tech finish from the above example, a set of special sensors, and a

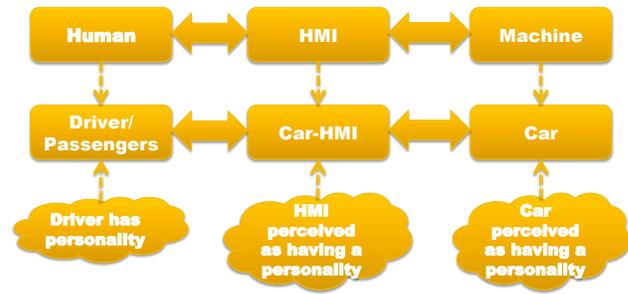


Figure 2. The general and specialized concept of Human Machine Interface gives a hint what could be perceived as having a personality.

user model, the car could change its color automatically and without further action of the user. An adaptive system or object does not need any expert knowledge from the user.

## Anthropomorphism

Finally, the term personalization can also be understood in terms of 'giving' a system or object a kind of personality or simulating a persona – in other words, to anthropomorph it. This understanding of personalization is noticeably different from the others and while analyzing movies, it was this meaning that led to the most interesting finds. In the rest of the paper we will focus on this notion of personalization.

## QUESTIONS REGARDING ANTHROPOMORPHISM

At this point, some questions concerning anthropomorphism arise: How can a personality be 'simulated'? And, if a personality is simulated, what is perceived as having a personality? Is it the car, a part of the car or maybe even something completely different?

In general, an HMI consists of a human, a machine and the HMI is in between. In our case the human is the driver or the passengers and the machine is the car. Given that simple notion of an HMI, the personality can be perceived (or 'attached' to) as either being part of the HMI or as being part of the car (see Figure 2). Nonetheless, having a closer look at the personality of the driver can also be interesting (see Section The Ultimate Convergence).

## ANTHROPOMORPHISM IN MOVIES AND TV SERIES

In this section we will take a closer look at some examples we found in movies and TV series.

### James Bond: Tomorrow Never Dies

One of the stereotypical features of James Bond movies is its very sophisticated customization of weaponry, gadgets and cars. In the 1997 movie *Tomorrow Never Dies!*, James Bond's car is an off the shelf BMW that got customized in various ways. The car can for example be remote-controlled by a mobile phone. What is interesting in terms of anthropomorphism is the speech output of the BMW: A female voice with a German accent. Accents are widely used in movies because of the stereotypes associated with them, often representing more than one characteristic.

For instance, an Italian accent in movies is often used for the

stereotype of a charming, latin lover but also for a mafioso. Another example is British English which, when used to emphasize on a character, often stands for either a gentleman or an imperialistic attitude (the imperial troopers in Star Wars speak British English).

If a person in James Bond or similar movies speaks with a German accent, he or she most likely is an evil scientist attempting world leadership. On the other hand, Germany stands for solid engineering, especially when it comes to cars<sup>1</sup>. In this example, the German accent could be a way to emphasize the origin of the car, but it might also have been used as a contrast: The potential sex appeal of a female voice is spoiled by a German accent.

Besides the accent, the following two sentences of the dialog are remarkable: “I thought you’d pay more attention to a female voice” and “Let’s see how *she* responds to my touch”. The first sentence, spoken by Q, the inventor of James Bond’s technical gadgets, gives the reason for the choice of a female voice: It seems to fit Bond’s preferences. Interestingly, early speech output systems in military planes used female voices, to make them distinguishable from the normal (human) radio traffic, which was dominated by males. The second line, uttered by Bond himself, shows that he perceives the car as being female and thus the personality seems to reflect on the car itself (or herself in this case) and not on the HMI.

Our conclusions: The car’s German accent underlines the corporate identity of BMW and expresses the solid engineering. The technology presented here is already feasible today. The personality is ‘attached’ to the car itself and not to the user interface.

### The Fifth Element

This movie is kind of a contrast to the James Bond movie above: The car also features speech output, but it is sounding very technical and is clearly artificial, but it also emulates a female voice. As in the Bond movie, there is no speech input, but lots of buttons<sup>2</sup>, a keyboard and a computer screen resembling an old text terminal (see Figure 3). The most interesting part is the driver identification, which is performed by inserting an ID card into a slot. This identification activates a spoken, personal greeting by the system, together with some personal, driving related information. All in all, the design is very technical and even though the movie plays in the far future and features flying cars, the UI looks outdated even if measured against today’s possibilities.

We assume that the director wanted to create some kind of dirty retro look as opposed to the clean-cut and tidy UIs often seen in science fiction.

Our conclusions: Because of the clearly artificial speech output and the archaic UI, there is not much feeling of person-

<sup>1</sup>Friendly hint for the reader: This article by four German authors is a solidly engineered attempt to rule the world. Please don’t tell anybody!

<sup>2</sup>Especially in older movies, lots of similar looking and sometimes even unlabeled buttons are used to depict the complexity of computer technology and the amount of expert knowledge needed to handle this technology. One famous example for this design is the computer in the TV series *Space 1999*. The use of this design in Luc Bessons 1997 movie seems a bit anachronistic—probably on purpose.



Figure 3. Computer keyboard(s) in *The 5th Element*

ality. The system seems outdated and not very user friendly. The personality, if there is any, is clearly attached to the UI and not to the whole car.

### Knight Rider (2008)

One of the most prominent examples of a car with personality in a TV series is of course *Knight Rider*. The series about Michael Knight and his car K.I.T.T. (short for Knight Industries Two Thousand) was very popular in the 1980ies. A less successful but technically more up to date series named *Knight Rider (2008)*<sup>3</sup> is based on it (see Figure 4).

Here, the car is portrayed as a co-worker and a personal



Figure 4. The 2008 model of K.I.T.T. from *Knight Rider*

friend. It features speech input and output and a Head-Up-Display (HUD).

The HUD is – at least in some parts – used as a ‘plot device’ or special effect, since it displays information even if nobody is in the car. The car is equipped with ‘super sensors’, e.g. it can sense people in a building, has detailed information

<sup>3</sup>Fun fact: In the 2008 version of the series, K.I.T.T. is the acronym of *Knight Industries Three Thousand*

about the inside of a building, etc. The car seems omnipotent (without further technical explanation) and acts as an information hub.

As in the James Bond movie, the car's personality is mainly expressed through the, in this case again very naturally sounding, speech output and through the content of the utterances, which contain personal information about the driver as well as detailed situational and context information (obtained through the various sensors of the car). During the series, the personality of the car is extended and improved through learning, e.g. through interaction with the driver.

Our conclusions: The personality is attached to the whole car and is mainly achieved through speech output. The whole concept, compared to nowadays technology, seems rather far fetched and exaggerated. The focus of the series is clearly more on its entertainment value than on technical feasibility.

### I, Robot

The script of this movie is loosely based on Isaac Asimov's classic short story collection of the same name [1]. Another classic short story by Dr. Asimov, *Sally* [2], already featured a robotic car with personality in 1953.

The car in this movie again features speech input and output. Usually, the car drives by itself, but it can be switched to manual steering, which seems – according to the reaction caused by it in the movie – rather unusual and is considered dangerous.

A personality is again achieved through the use of the



Figure 5. HUD in *I, Robot*

speech output and utterances that have personal and context information. Furthermore, this car is the first in our list to have an anthropomorphic face (see Figure 5). Though the face is clearly artificial, it does have all main features of a face (e.g. eyes, nose and mouth). In this movie, the face does not represent the car or the car's UI, but a central intelligence that also appears on personal computers and the like. Our conclusions: In addition to using speech output, this car also uses an anthropomorphic face to create a sense of personality. Although the face could be accepted as a representation of the car's personality, the reappearance of that same face in various other locations makes clear that is an avatar for some central intelligence in that movie. Even if not directly addressed in the movie, the concept of a recognizable face could also be interesting if each user had such a 'digital assistant' with a unique face (e.g. the same face appears at home on the TV, PC, refrigerator, in the car, on the personal mobile device ...). This could be used to gain trust of the user.

### Total Recall

This movie also features an anthropomorphic interface, but instead of a rendering shown on a HUD, it is realized as the upper third of a humanoid puppet resembling a taxi driver (see Figure 6). The puppet is clearly mechanical. As the car in *I, Robot*, this car also drives by itself<sup>4</sup>. The 'taxi driver' can be seen as a way to distract the passengers from the awkward feeling that the car drives by itself, to give the traditional feeling of a taxi ride and to encourage a natural interaction. The user interface has speech input and output, although its dialog system is rather simplistic. In the respective scene, the 'taxi driver' asks for a destination and does not seem to be able to accept any other information, like for example the protagonist's request to 'just drive'. Although the movie is from 1990, this behavior can be observed in today's navigation systems that feature a speech based input of the desired destination.

Our conclusions: Similar to *The Fifth Element*, the achieved



Figure 6. Anthropomorphic interface in *Total Recall*

personality is not very convincing, but this time this is more due to the clearly mechanical look of the avatar and the simplistic speech dialog system. Through the resemblance as a taxi driver, the personality is attached to the HMI and not to the car. Instead of underlining the personality, the anthropomorphism is used to overcome awkward feelings and to encourage natural user interaction.

### Herbie

In 1969 Walt Disney Productions released the movie *Herbie: The Love Bug*. Many sequels followed, with the 2005 feature *Herbie: Fully Loaded* being the latest. The main character in the series is a Volkswagen Beetle called 'Herbie' that somehow developed a mind of its own. This is in contrast to the other cars we discussed so far, since their personality, if existent, was clearly engineered. Also in contrast is the way that the personality is achieved: Herbie does not have speech output (at most he has some kind of 'honk output'). He also does not have a dedicated speech input, but seems to be able to understand things that are spoken around him. Herbie is also able to drive by itself, but he does this out of his own motivation and not because a passenger tells him his destination. Nonetheless, he clearly seems to have a personality, which is achieved by mimicking human facial

<sup>4</sup>A switch to manual steering is done by a 'brute force' approach (i.e. tearing the 'driver' out of its socket).

expressions: The headlights serve as eyes and the bumpers as lips (see Figure 7).



Figure 7. Beetle *Herbie* in love

Our conclusions: Personality can also be expressed through facial expressions. Since Herbie acts on his own will, he does not have a UI and thus the personality is clearly attached to the car. The use of headlights and bumpers to mimic facial expressions can be seen as a new modality. Interestingly enough, in a United States Patent [5], Mori et. al. describe how this modality could be used to “create a joyful, organic atmosphere rather than the simple comings and goings of inorganic vehicles. Such emotive, organic vehicles could also lead occupants to have greater affinity for their vehicles, and make the driving experience more comfortable.”

### Harry Potter and The Chamber of Secrets

This is another example of a car with a personality that is not engineered. The car is a normal ‘off the shelf’ automobile which got jinxed to be able to fly (see Figure 8). It doesn’t show any personality at first until it gets angry. The personality is not shown by facial expressions but by mimicking human behavior: Anger is shown by throwing the owners out and driving off. Later the car shows loyalty by rescuing its owners out of a dangerous situation. There is no speech output and no obvious signs of a speech input, but the seems to have some kind of (magic) sensory (detecting danger etc.)

Our conclusion: The personality is attached to the car and



Figure 8. Magic flying car in *Harry Potter*

is realized by mimicking human behavior.

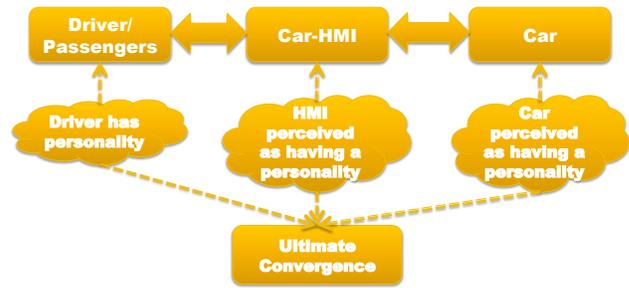


Figure 9. Combining the driver’s personality with the car’s personality leads to the ultimate convergence.

### THE ULTIMATE CONVERGENCE

The previous examples show that personality can be attached to the car itself or to its user interface. Normally (hopefully) the driver of a car also has a personality. An interesting question arises: What happens if the personality of the driver and the car converge, i.e. become one (as depicted in Figure 9)? The movie *Cars* dwells on the idea:

### Cars

Vehicles in *Cars* represent stereotypes of car models or car manufacturers: The flamboyant racing car, the successful business woman as a Porsche, the country boy as a tow truck etc. The cars do not use the headlights as eyes (like Herbie), but have eyes drawn on the windscreen. One scene shows different celebrities rendered as a car, for instance Jay Leno’s big chin, Arnold Schwarzenegger as a Hummer with his Austrian accent (see Figure 10).

Our conclusions: The driver and car become one. Since



Figure 10. *Cars*-characters resembling Jay Leno and Arnold Schwarzenegger

there is no more human involved, no HMI is needed. The cars are talking to each other, which could be considered Car2Car or even Car2X communication.

It is interesting to see how different car models and car manufacturers fit to stereotypes. Do people choose a car matching their personality?

### SUMMARY AND CONCLUSION

In this paper, we presented and described four types of personalization and put them in the context of automotive HMI in movies: customization, adaptability, adaptivity, and personality.

We analyzed several movies and identified the following different ways to achieve personality emulation: 1. Speech synthesis, 2. anthropomorphic avatars, 3. facial expressions,

SPEECH	Personality emulation modes				Personality is associated with		
	AVATAR	FACE	BEHAVIOUR	MOVIE	HMI	CAR	OTHER
James Bond	✓					✓	
5th Element	✓				(✓)		
Knight Rider	✓			✓		✓	
I, Robot	✓	✓			✓		
Total Recall	✓	✓	(✓)		(✓)		✓
Herbie			✓	✓		✓	
Harry Potter				✓		✓	
Cars	✓	✓	✓	✓		✓	

**Table 1. Different personality emulation modes**

and 4. mimicking human behavior (see Table 1). The personality can be associated with the HMI, with the car, or in the case of *I, Robot* with some other entity, i.e. a central intelligence (see Table 1). The question arises whether or not this kind of personalization could be transferred to real-life cars. On a most down-to-earth level: The corporate identity of the manufacturer can be reflected through personality. This is possible with slight modification of speech synthesis, e.g. emotional speech synthesis, as, for instance, in [7]. On a more experimental level, some work has already started in the field of mimicking facial expressions with the use of the car's bumpers and headlights. The most far fetched: Car and driver become one entity. This could be possible with AI. At the moment, the practical benefit and relevance is still questionable.

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