Pictures of You, Pictures of Me
User Acceptance of Camera-technology in Intelligent Transport Systems

Teresa Brell, Ralf Philipsen and Martina Ziefle
Human-Computer Interaction Center, RWTH Aachen University, Campus-Boulevard 57, 52074 Aachen, Germany

Keywords: Camera-acceptance, Camera Design, User Diversity, Intelligent Transport Systems, Traffic Infrastructure.

Abstract: The integration of connected and smart technology is a key factor of our future traffic system development. By integrating traffic participants into the technology development circle, possible trade-offs, obstacles and advances can be identified and further, an understanding of technology acceptance can be evolved. This paper will show, how camera-based technology in intelligent transport systems is evaluated from a user-centred perspective. The focus of this work lies on the identification and evaluation of perceived benefits and barriers, but also conditional and functional aspects are investigated as well as an overall acceptance picture. Results show, that the need for technology is not denied, but privacy concerns and a feeling of surveillance still restrain users.

1 INTRODUCTION

Today, smart technologies are integrated in many parts of our life: private, public and societal life as well as business or working sector. The overarching aim of integrating smart functions is functional by nature: These processes, objects and functions direct to optimize technology, increase the effectiveness and efficiency of processes, and by this, decrease energy consumption, enhancing safety, and minimizing human error. Adapted lighting, self-regulating thermostats or virtual medical care are just small examples of what can be connected to our homes and offices (Asadullah, 2017). This shows just the surface of the diverse scope of user-centred technology interaction in many areas of application. Various technological enhancements are used to develop seamless integration of those technical functions into our daily life and further.

A very prototypical case for minimizing human error are intelligent transport systems (ITS) (Figueiredo et al., 2001). ITS or connected cars aim a sustainable supply for all residents and moreover an increase of traffic safety and providing maximum comfort for travellers (Alam et al., 2016, Gora & Rüb, 2016). There are different technological approaches on how intelligent transportation might work efficiently. One way to support smart transportation technology could be camera-based traffic participant detection (Datondji et al., 2016).

The idea behind the camera-based detection is simple: A smart infrastructure, able to detect traffic participants (type, number, and density of participants) could customize transportation functions or traffic-relevant processes: e.g. the traffic light phases to adapt to intense traffic. However, the technology behind the idea is not simple: to ensure a complete coverage, the detection of all street markings (Wang et al., 2000), in real-time (Aly, 2008), multi-lane perception (Abramov et al., 2016), based on accurate geometric lane estimation (Kang et al., 2014) is needed, just to name a few.

Current research in this area focuses mainly on technical issues, whereas integrating the users in the technological development process is a key part for societal acceptance (Rogers, 2003). Most studies in traffic technology, which integrate the user focus on usability issues, e.g. data visualization or transfer of control (Rakotonirainy et al., 2014), but lack to identify user' requirements on communication and information on data exchange in traffic.

Especially when integrating cameras into public places and streets, the trade-off between security and safety on the one and the unwanted feeling of continuous surveillance on the other hand is an intricate issue for user acceptance (van Heek et al., 2016a, 2017). Even though residents value the increase of public safety and security, the violation of public's privacy through recording, storage and processing of (video) data is a serious barrier of using cameras in

Brell, T., Philipsen, R. and Ziefle, M.
Pictures of You, Pictures of Me.
DOI: 10.5220/0006700603710378
In *Proceedings of the 4th International Conference on Vehicle Technology and Intelligent Transport Systems (VEHITS 2018)*, pages 371-378
ISBN: 978-989-758-293-6

public spaces (Patton, 2000). A steadily growing distrust to share data with a smart infrastructure, general concerns and drawbacks could be identified in previous studies (Schmidt et al., 2015b). The identification of perceptional obstacles in camera-based traffic technology to understand the acceptance or willingness to actively cooperate by sharing data is insufficiently explored so far. So, the question remains: Would people accept a temporal (or permanent) installment of cameras in traffic?

2 METHODOLOGICAL APPROACH & QUESTIONS ADDRESSED

A user-focused technology design addresses the identification of influential acceptance factors as a major process step. Subsequently, the user should be part of the technology development in an iterative process. To understand, which (perceived) obstacles and advantages come with the use of camera-based technology in traffic, we followed a two-tiered empirical research approach.

Qualitative (expert-) interviews, in which the possible usage scenarios were discussed, helped us to identify benefits and barriers of the technology alongside questioned functions, conditions and acceptance patterns of/for the camera-technology.

Further, the results of the qualitative studies were integrated into the quantitative questionnaire study to follow the methodological approach of our research model. The present work focuses on an understanding of the acceptance of camera-based technology in traffic.

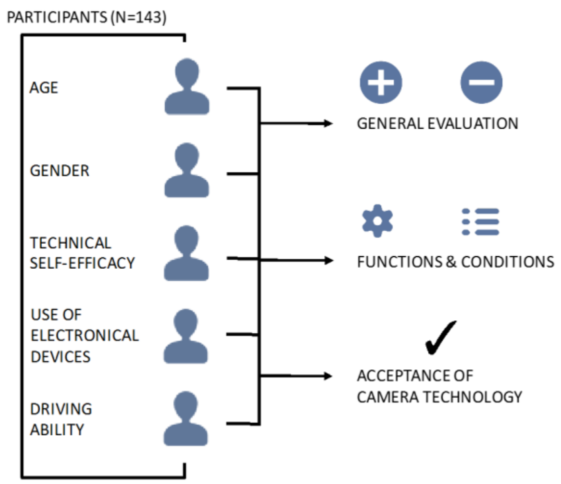

Figure 1: Methodological concept of research model.

As can be seen from Fig. 1, the research perspective is user-centred. The methodological approach shows three main research branches, which are addressed by the empirical procedure:

- **I.** the overall perception of benefits and barriers of the camera-technology,
- **II.** the overall evaluation of functions and conditions of the camera-technology,
- **III.** a user-diverse look on acceptance patterns.

2.1 The Survey: Development of the Questionnaire Instrument

The used questionnaire survey was divided in several parts. First, an informational text introduced the topic of camera-based traffic technology to the participants.

2.1.1 Demographics and Traffic Behaviour

The first thematic section addressed demographic data and questioned, if the participants own a driver's licence. Further, a self-assessment of the driving skills and driving type was queried along the frequency of vehicle usage. Also, the technical affinity (Karrer, 2009) and the technical self-efficacy was measured (Beier, 1999), the individual confidence in one's capability to use technical devices.

2.1.2 Camera Technology

In the second section, two sets of eight items (6-point Likert scale, 6=full agreement) questioned the advantages (cf. Table 1) and disadvantages (cf. Table 2) of camera-based technology in traffic environment. Here, we could fall back on previously identified arguments of qualitative studies, to help the participant to evaluate the technology.

Table 1: Items of technology advantages.

I see the use of this technology positively, because…
…it increases traffic safety for all participants.
…it increases personal perceived traffic safety.
…it helps to prevent accidents.
…it helps to reduce traffic jams.
…it organizes the traffic more efficiently, so I save travel time.
…traffic offender can be found more easily.
…the intelligent infrastructure and daily traffic situations will be optimized.
…exonerates the traffic for all traffic participants.

Reliability analysis revealed high internal consistencies for the scales with Cronbach's α = .892 for the technology advantages and Cronbach's α = .891 for the technology disadvantages.

Table 2: Items of technology disadvantages.

I see the use of this technology negatively, because…
…cameras transport a surveillance feeling.
…it bothers me that my data can be collected.
…the use of cameras compromises my privacy.
…I fear to lose my anonymity in traffic.
…I think the cameras do not function properly.
…I don't want the traffic infrastructure to be digital and connected.
…there is no need for technology in traffic.
…cameras are a distraction in traffic.

2.1.3 Camera Scenarios

The third section was divided into two possible camera-scenarios. First, a bird-eye view picture of an intersection was shown as location example followed by in informative text to help the participants envision the possibilities of camera-based technology usage in traffic. A visualization of the camera type (internal vs. external) was shown (see Figure 2) next along an allocation of characteristics in form of a semantic differential (Osgood, 1952, Bradley & Lang 1994) towards the technology (categorized results from the interview studies). The used attributes were derived from previous (expert-)interviews.

Figure 2: Visualization example of internal camera design (on the left) and external camera design (on the right) as used in online survey.

Further, the approval of several camera functions was questioned (see Table 3).

Table 3: Items of camera functions.

What functions should camera technology have in your opinion? The camera should be able to / have …
…save pictures (data) up to 24h.
…permanently analyse data material.
…swivel (moving around).
…process the material directly (no data storage).
…a predetermined angle of recording. (e.g. safety equipment).
…analyse pictures (data) only in a predetermined time frame (e.g. between 6 and 9 am).
…only one alignment.
…zoom.
…interact with smartphones.

The last part of this section queried the acceptance of the technology in terms of consent to the user of camera technology with eight items (6-point Likert scale, 6=full agreement).

2.2 Data Acquisition and Analysis

The survey was conceived as an online study. Participants were addressed through acquisition in the university environment and in online forums focusing on safety, road transport or mobility in general. Abandoners and speeders were excluded from the analysis during the quality check of the data. Data was analyzed descriptively and, with respect to the effects of user diversity, by ANOVA procedures and linear regression. The level of significance was set to α=.05. Cohen's *d* is reported for effect sizes. The remaining data was analysed with non-parametric procedures (cross-checked by parametric statistical evaluation methods for group comparisons). Non-parametric procedures are reported when minor violations of the procedural requirements, i.e. deviation from normal distribution of data, could be expected to result in an underestimation of the p-values. Spearman correlation coefficients are reported for bivariate relationships.

2.3 Participants

In total, N=143 responses were included in the analysis. The age ranged from 18 to 66 years, with an average of 31.9 years (**S**tandard **D**eviation=11.7). The gender distribution was almost equally distributed

with 67 men (46.9%) and 76 women (53.1%). The educational level of the sample was rather high, with 60.1% holding a university degree (n=86), followed by 25.2% with a general higher education entrance qualification (n=93) and 7.7% have a secondary school certificate (n=11) plus 7.0% stated another level of education (n=10). All participants reported a rather high technically self-confidence with 4.2 / 6 (SD=0.9). Here, men are slightly more technical self-affine (M=4.6; SD=0.8) than women (M=3.8; SD=0.9) with $t(141)=-5.056$, p<.001, $d=0.847$.
The majority (n=135, 94.4%) holds a driving licence. The sample evaluated the overall driving style as rather bold (**M**ean=3.2 out of 5 points max.) and fast, but cautious, defensive and comfortable (see Table 4):

Table 4: Self-evaluation of driving style with 0=left attribute and 5=right attribute (N=143).

Driving type attributes 0	5	M	SD
Fearful	Bold	3.2	1.3
Slow	Fast	3.0	1.2
Cautious	Risky	1.9	1.2
Defensive	Offensive	2.2	1.3
Comfortable	Sportive	2.2	1.2

3 RESULTS

In the following section the obtained results will be presented in detail. First, the general findings about the acceptance of camera technology are presented. We report the perceived benefits and barriers related to camera technology use in traffic. First, the participants were invited to agree or disagree to different pro and contra camera-technology based statements. The statements were formulated on the base of the qualitative research carried out prior to this questionnaire study. Further, they had to evaluate several functions and conditions of the technology.

3.1 General Results

In a first step, we report an overview of the general questions about the level of information the participants had about both, camera use in traffic today and information about the topic connected driving. In total, 75,5% (n=108) of the participants stated that they noticed camera use in traffic before. Further, 44,1% stated that the have heard about the topic connected driving – so 55,9% (n=80) are new to the development.

3.1.1 Perceived Benefits

All beforehand identified benefits were accepted (cf. Table 5). In summary, the most anticipated benefit for the participants was to identify traffic offenders with an average approval rating of 4.8 (SD=1.0). Following accepted benefits address the optimization of traffic flow: optimizing the traffic infrastructure (M=4.4, SD=1.0) and reducing traffic jams (M=4.2, SD=1.2). The increase of personal safety (M=3.7, SD=1.2) and preventing accidents (M=3.7, SD=1.3) had comparably lower ratings.

3.1.2 Perceived Barriers

Regarding the possible barriers to the use of camera-technology especially statements dealing with privacy and data protection provoked serious concerns (high approval ratings). On average, the participants

Table 5: Perceived benefits and barriers of camera-technology (mean agreement and standard deviations, 1 = no agreement, 6 = full agreement).

Camera-technology evaluation						
Benefits	M	SD	N	SD	M	**Barriers**
Increase personal traffic safety	3,7	1,2	143	1,3	2,6	Cameras distract in traffic
Prevent accidents	3,7	1,3	143	1,2	2,9	No need for technology
Save travel time	3,8	1,2	143	1,3	3,3	Not wanting digital & connected traffic
Exonerate traffic	3,9	1,1	143	1,3	3,5	Camera not functioning properly
Increase overall traffic safety	4,1	1,1	143	1,5	3,6	Loss of anonymity in traffic
Reduce traffic jams	4,2	1,2	143	1,5	3,8	Compromise of own privacy
Optimize infrastructure	4,4	1,0	143	1,5	4,0	Feeling of data collection
Find traffic offender	4,8	1,0	143	1,4	4,2	Surveillance feeling

agreed that cameras convey a feeling of surveillance (M=4.2, SD=1.4) and the possible collection of (my) data is also perceived negatively (M=4.0, SD=1.5). The participants did rather not agree on the statement, that cameras are a distraction in traffic (M=2.6, SD=1.3).

When comparing the extent to which benefits, and barriers were confirmed, it becomes apparent that the confirmation of the benefits is much more pronounced (with the highest evaluation of 4.8 points and the lowest evaluation of 3.7 points) in comparison to the barriers (max: 4.2 points and 2.6 points as lowest evaluation). This shows that participants tend to tolerate the barriers while clearly valuing the benefits of having cameras on public traffic routes.

3.1.3 Functions and Conditions

The functions and conditions of the questioned camera-technology were taken from a beforehand taken expert interview.

The most anticipated camera functions are the data storage time of 24h max. (M=3.9, SD=1.3), processing the material directly (no data storage) (M=3.9, SD=1.1) and the possibility to swivel (move around) (M=3.7, SD=1.2). The permanent analysis of data material (M=3.3, SD=1.3) and the possibility to interact with the camera (M=2.6, SD=1.3) are (rather) not agreed upon. As for the conditions, almost all of them were perceived as highly important (see Figure 3). Here, especially the condition to enhance safety in traffic (M=5.1, SD=1.2), a functioning technology (M=5.0, SD=1.1) and the condition of data security (M=5.0, SD=1.2) are perceived most important.

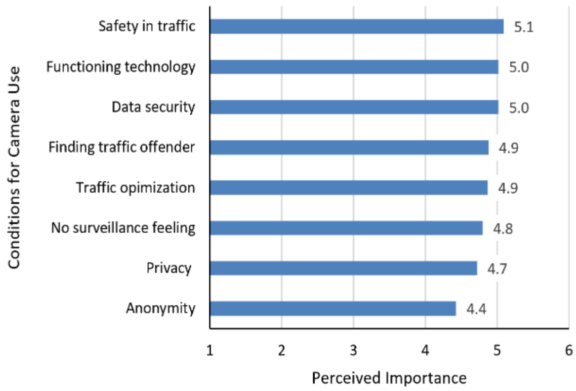

Figure 3: Mean importance of different conditions for camera use (0=min. importance, 6=max. importance).

3.2 User Diversity in the Evaluation of Camera Technology

Looking at the influence of user factors on the perception of advantages and disadvantages as well as on the general acceptance of the use of camera technology in traffic context, it becomes apparent that some of the user characteristics considered have a significant effect, but can only explain the user evaluations to a minor degree.

As can be seen in Fig. 4, there is no significant correlation between age on the one hand and other user factors and the evaluation of camera use on the other hand. In contrast, there is a weak, positive correlation between gender and both technical affinity and self-confidence. Male participants stated higher values for both attributes. There is a medium positive correlation between both attributes themselves. In addition, gender was positively correlated with the driving style: Men agreed more strongly that they drive

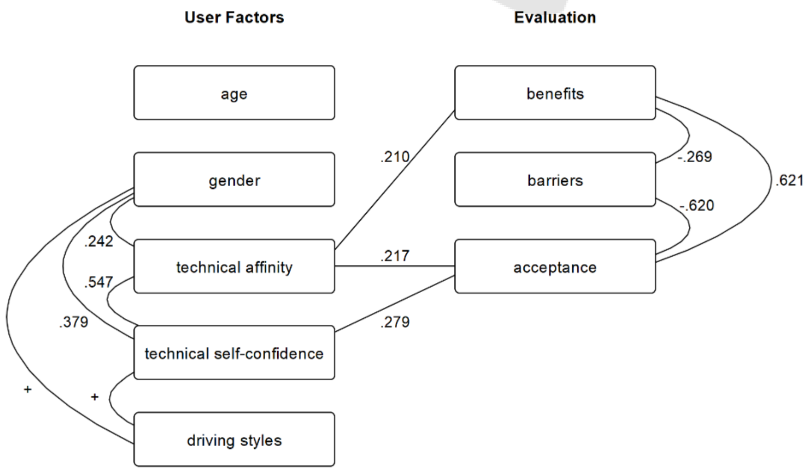

Figure 4: Significant relations (Spearman correlation coefficients) between user characteristics, perceived benefits and barriers as well as general acceptance of camera use.

courageous (r_s=.399), faster (r_s=.397), offensive (r_s=.280), and risky (r_s=.246) than women.

Looking at the evaluation of camera use, it was obvious and expected that the agreements to benefits and barriers were negatively correlated. Participants who agreed to the benefits showed less concerns about barriers and vice versa. However, the correlation was only weak. Unsurprisingly, there is a connection between the general acceptance of the technology and the approval to both benefits and barriers (contrary).

More central for the research question than the correlations among each other within a factor group are the correlations between user factors on the one hand and the camera evaluation on the other. Fig. 4 indicates that age, gender and the individual driving style have no effect on the perception of the technology. Apparently, we see a quite homogeneous attitude towards camera usage across participants that is not modulated by individual factors.

As one exception, the technical affinity was positively correlated with both the agreement to benefits and the general acceptance. Interestingly, there was no relationship between the affinity and the perception of barriers. The technical self-confidence was even only correlated with the acceptance measurement. However, all correlations between user characteristics and technology evaluation were only of minor degree (see Fig. 4) and cannot fully explain the small but existing variance at the participants' attitudes. A linear regression analysis confirmed the emerging picture and identified the technical affinity as most explaining factor. However, with R^2=.179 the explained share of variance was rather low.

3.3 Attributions to Camera Designs

By looking at the attribution of the descriptive adjectives to the two presented camera designs, almost all pairs of terms with a more positive adjective were predominantly attributed to both camera designs. The cameras were attributed as "useful", "safe", "protected", "controllable", "elegant", and "modern" (see Fig. 5). The only exception is the "observing property" that has been assigned to both designs and the "unfamiliarity" that was mentioned for the integrated cameras. However, the participants made a few significant distinctions based on the design for a few attributes (where Wilcoxon Tests showed p<=.002).

At first, integrated cameras where perceived as "cheaper" than external cameras. Looking at the functionality, it became clear that the participants considered integrated cameras as more "protected" than external ones. Most interestingly, the visibility of the

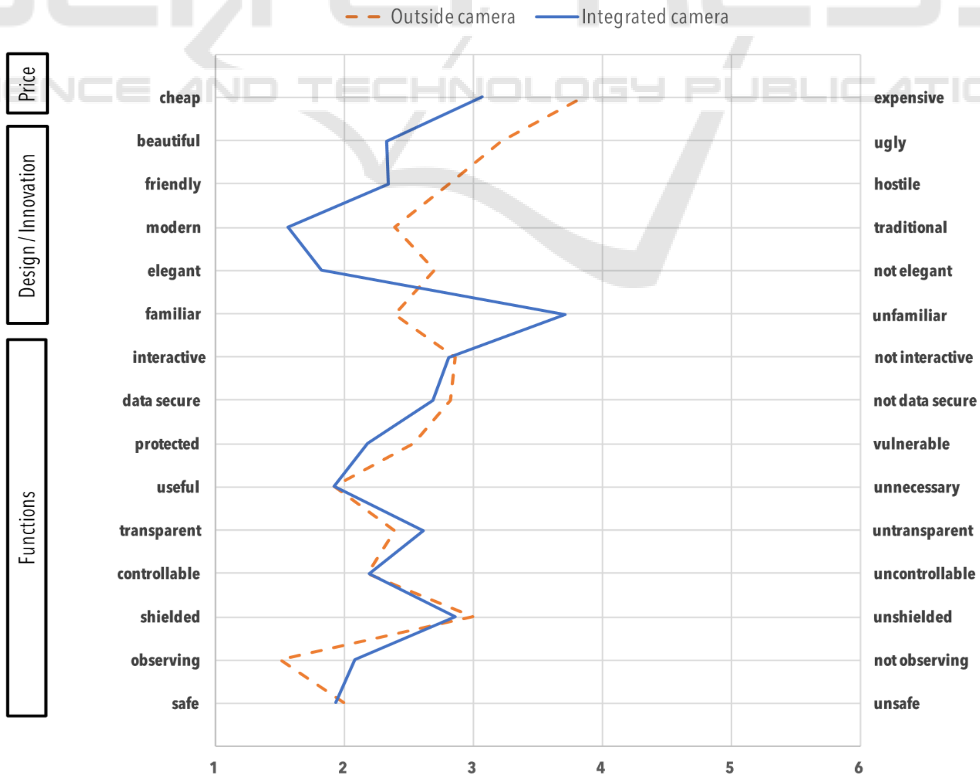

Figure 5: Attribution of descriptive adjectives to different camera designs

camera led to a stronger attribution of an "observing characteristics" in comparison to internal cameras, which are usually hidden from sight.

The biggest differences in the users' attributions were found for design and innovation. Internal cameras were perceived as significantly more "modern", "elegant", "beautiful", and "friendly", whereas external cameras were considered as more "familiar".

4 DISCUSSION & CONCLUSION

The current study was directed to the user's view on the possible use of camera-based technology in smart infrastructure environments with the aim to identify and integrate users' requirements and concerns during the technology development and roll-out.

It is noticeable that the utilization of camera technology was rated mainly positively. The participants both attributed usefulness to the camera systems and predominantly agreed to the benefits of it. A general rejection could not be determined. While the installation of cameras in public places in Germany to prevent crime is generally discussed controversially (cf. van Heek et al., 2016a, b), the perception of camera use in traffic and transportations systems seems to be more homogeneous and positive. It is remarkable, however, that the cameras' capability to find traffic offenders was considered as most important. This localizes the technology in the traditional context of surveillance of criminal prosecution, while functions that include optimization goals (e.g. saving travel time or exonerating traffic) were perceived as less important. Also, these two functionalities support intelligent transport systems to optimize specifically energy-saving and safety. This might indicate that the participants' mental concepts of a camera technology somehow are still similar to conventional CCTV systems, and not yet fully adapted to the specificity of intelligent transportation. Public communication policy as well as a sensible information strategy will have to address this by explaining the new intelligent functionalities to cope with the barriers, which were perceived despite the majority approval of the technology.

Looking at these possible impediments to public acceptance of the integration of camera-technology in traffic infrastructure, especially statements dealing with privacy and data protection provoked serious concerns. Here, a clear resemblance towards other privacy concerns in V2X-technology usage can be identified (cf. Schmidt et al., 2015a), which directs to the suggestion that privacy is one of the most prominent acceptance factors for connected traffic-technology. At first glance, it appears inconsistent that the participants named the feeling of being monitored as the most important drawback, while surveying and identifying traffic offenders was rated as the most relevant benefit. This "wash me, but don't make me wet"- mentality among laypeople clarifies the problem of finding the optimal balance during technology development and application: Surveillance as the most central and powerful skill of the cameras in intelligent transport systems is at the same time also the function that causes the most concern. Future work should provide a deeper insight into user requirements in more specific usage contexts and regarding technical parameters, i.e., motion and behaviour detection and analysis, and data handling, to be able to parameterize the technology more fine-grained.

To understand the influence of user factors on the perception of camera technology in intelligent transportation scenarios, the individual affinity for technology was identified as an explanatory factor for general acceptance. In previous studies, this attitude had been found to significantly influence the acceptance of novel technology in general (cf. Calero Valdez et al., 2017), but also in vehicle technology in particular (cf. Schmidt et al., 2015a,b). However, the close connection of technical self-confidence with technology acceptance is on the one hand hardly surprising and on the other, it was found that 80% of the variance in the user ratings of the technology cannot yet be explained. Concluding, the perception of barriers appears very homogeneous and independent of individual user factors in the present study. This contradicts previous results regarding the effects of age on the evaluation of camera technology in non-traffic surveillance scenarios (cf. van Heek et al., 2016b) and indicates (again) that findings about camera acceptance cannot be generalized by disregarding the application context.

Consequently, further research is needed for a better understanding of the explanatory factors and the reasoning behind the users' evaluation of camera technology in transportation. Therefore, additional individual attitudes and personality traits, e.g., the need for security, the need for privacy, or the surveillance anxiety, should be considered in future work. The habit of getting used to cameras and the safety culture of society might also play a role, which could not yet be considered in the present study with a sample limited to Germany. Therefore, cross-cultural comparisons including countries that are already focusing more on camera use in the public area are necessary.

Finally, the comparison of camera designs revealed that integrated cameras should be preferred over external ones. The integrated camera design was perceived as more modern, friendly, beautiful and elegant. Even the assumption that internal cameras are perceived as more observing, because they are hidden and not obvious, could not be confirmed. The increasing miniaturization and concealment of sensor and camera systems and related ubiquitous computing seems to be unproblematic for the acceptance of the systems, at least in the present study.

ACKNOWLEDGEMENTS

The authors thank Emine Deveci, Kevin Wegener and Florian Groh for their research assistance. This research was supported by the project I2EASE, funded by the German Federal ministry of Research and Education [under the reference number 16EMO012K]. Special thanks go to project partner OSRAM for technical know-how and visual material.

REFERENCES

Abramov, A., Bayer, C., Heller, C., & Loy, C., 2016. Multi-lane perception using feature fusion based on GraphSLAM. In *Intelligent Robots and Systems (IROS), 2016 IEEE/RSJ International Conference on*, 3108-3115. IEEE.

Alam, M., Ferreira, J., & Fonseca, J., 2016. Introduction to intelligent transportation systems. In *Intelligent Transportation Systems,* 1-17. Springer.

Aly, M., 2008. "Real time detection of lane markers in urban streets," in *IEEE Intelligent Vehicles Symposium,* 1, 5

Asadullah, M., & Ullah, K., 2017. Smart home automation system using Bluetooth technology. In *Innovations in Electrical Engineering and Computational Technologies (ICIEECT), 2017 International Conference on,* 1-6. IEEE.

Beier, G., 1999. Kontrollüberzeugungen im Umgang mit Technik [Locus of control when interacting with technology]. In *Report Psychologie*, Vol. 24(9), 684-693.

Bradley, M. M., & Lang, P. J., 1994. Measuring emotion: the self-assessment manikin and the semantic differential. In *Journal of behavior therapy and experimental psychiatry*, *25*(1), 49-59.

Calero Valdez, A.; Brell, J.; Schaar A. K. & Ziefle, M., 2017. The diversity of why. A meta-analytical study of usage motivation in enterprise social networks. *Journal of the Universal Access in the Information Society (2017).* doi:10.1007/s10209-017-0561-9.

Datondji, S. R. E., Dupuis, Y., Subirats, P., & Vasseur, P., 2016. A survey of vision-based traffic monitoring of road intersections. In *IEEE transactions on intelligent transportation systems*, *17*(10), 2681-2698.

Figueiredo, L., Jesus, I., Machado, J. T., Ferreira, J. R., & De Carvalho, J. M., 2001. Towards the development of intelligent transportation systems. In *Intelligent Transportation Systems, 2001. IEEE Proceedings.* 1206-1211.

Gora, P., & Rüb, I., 2016. Traffic models for self-driving connected cars. In *Transportation Research Procedia*, *14*, 2207-2216.

Kang, S., Lee, S., Hur, J. and S. Seo, 2014. Multi-lane detection based on accurate geometric lane estimation in highway scenarios. In *IEEE Intelligent Vehicles Symposium, 2014*, 221–226.

Karrer, K., Glaser, C., Clemens, C. & Bruder, C., 2009. Technikaffinität erfassen – der Fragebogen TA-EG. In A. Lichtenstein, C. Stößel und C. Clemens (Hrsg.), Der Mensch im Mittelpunkt technischer Systeme. 8. Berliner Werkstatt Mensch-Maschine-Systeme In *ZMMS Spektrum, Reihe 22, Nr. 29*, 196-201. Düsseldorf: VDI Verlag GmbH.

Osgood, C. E., 1952. The nature and measurement of meaning. In *Psychological bulletin*, *49*(3), 197.

Patton, J. W., 2000. Protecting privacy in public? Surveillance technologies and the value of public places. *Ethics and Information Technology*, *2*(3), 181–187.

Rakotonirainy, A., Schroeter, R., & Soro, A., 2014. Three social car visions to improve driver behaviour. In *Pervasive and Mobile Computing*, Vol. 14, 147-160.

Rogers, E., 2003. Diffusion of Innovations. Free Press, New York, NY.

Schmidt, T., Philipsen, R., & Ziefle, M., 2015a. Safety first? V2X – Perceived benefits, barriers and trade-offs of automated driving. In *Proceedings of the 1st Internatio-nal Conference on Vehicle Technology and Intelligent Transport Systems (Vehits 2015).* SCITEPRESS, 39-46.

Schmidt, T., Philipsen, R., & Ziefle, M., 2015b. From V2X to Control2Trust - Why trust and control are major attributes in Vehicle2X Technologies. In *T. Tryfonas and I. Askoxylakis (Eds.)*: HAS 2015, LNCS 9190, 570–581, Springer.

van Heek, J., Arning, K. & Ziefle, M., 2017. Where, Wherefore, and How? Contrasting two surveillance contexts according to acceptance. 6th International Conference on Smart Cities and Green ICT Systems (Smartgreens 2017), pp. 87-98; SCITEPRESS – Science and Technology Publications.

van Heek, J., Arning, K. & Ziefle, M., 2016a. The Surveillance Society: Which Factors Form Public Acceptance of Surveillance Technologies? In: M. Helfert, C. Klein, B. Donnelley, O. Gusikhin (Eds.). Smart Cities, Green Technologies, and Intelligent Transport Systems. Part of the Communications in Computer and Information Science book series., vol 738, pp 170-191. Springer.

van Heek, J., Arning, K., & Ziefle, M., 2016b. Understanding Age-Related Differences in Privacy-Safety Decisions: Acceptance of Crime Surveillance Technologies in Urban Environments. In International Conference on Human Aspects of IT for the Aged Population (pp. 253-265). Springer.

Wang, Y., Shen, D. and E. K. Teoh, 2000. Lane detection using spline model, In *Pattern Recognition Letters, vol. 21, no. 8, 2000*, 677–689, 1,5.