Robot-Like In-Vehicle Agent for a Level 3 Automated Vehicle

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With the rapid development of automotive technology and artificial intelligence, in-vehicle agents have a large potential to solve the challenges of explaining the system status and the intentions of an automated vehicle. A robot-like in-vehicle agent was developed to explore the in-vehicle agent communicating through gestures and facial expressions with a driver in an SAE Level 3 automated vehicle. An experiment with 12 participants was conducted to evaluate the prototype. Results showed that both interactions of facial expressions and gestures can reduce workload, and increase usefulness, and satisfaction. However, gestures seem to be more functional and more preferred by the driver while facial expressions seem to be more emotional and preferred by passengers. Furthermore, gestures are easier to notice but hard to understand independently and facial expressions are hard to notice but more attractive.

Additional Key Words and Phrases: In-Vehicle Agent, Robot-Like Agent, Gesture, Facial Expression, Voice Interaction

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1 INTRODUCTION

With the development of automotive technology and artificial intelligence, in-vehicle agents (IVAs) have emerged as a transformative innovation for intelligent transportation systems. These agents are often embodied as driving assistants and integrated into the driving system. IVAs are classified as voice agents, virtual agents, and physical agents. The purpose of integrating IVAs of any type is to help the driver with driving tasks and improve the driving experience [29].

1.1 In-Vehicle Agents in Manual and Automated Vehicles

In the manual driving context, the IVAs can not only help with driving-related tasks like vehicle-to-vehicle communication (both vehicles need to install IVA) [16], or non-driving related tasks like comfort children to reduce distractions for the driver [13], but also minimize driver's distraction by decreasing the number of directed utterances with a set of robots [22], reduce driver's fatigue through social communication [26], and mitigate drivers' negative affective status through giving positive comments about the situation [31].

IVAs can explain the system status and intentions of an automated vehicle (AV) [18, 24, 30, 36, 45]. The user interface (UI) of IVAs can be a voice UI [24], a visual UI [18], or a physical UI [9]. Lee and Jeon [29] suggest that physical agents aid better results in driving behaviour and overall experience, especially in the context of automated driving (AD). Zihsler et al. [45] and Chakravarthi et al. [9] showed that physical agents with facial expressions and gestures, respectively, can increase trust in AVs.

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In an AD context, IVAs perform better in improving overall experience [29], such as explaining the system status with animation of a chauffeur avatar and a world in miniature [18], or using "How + why message" to lead better driving performance [24]. On the other hand, an IVA can serve as a companion by adopting a conversational dialogue style, using emotional tones and first-person language, which fosters a 'human-agent relationship' with the driver [27], giving the driver a sense of a "human-agent relationship". Furthermore, IVAs can increase trust and acceptance in AD using social cues and anthropomorphism to translate the car's state into human behaviour and expressions, which can be interpreted intuitively by the driver [45].

The physical agents can be divided into consumer products in the market and prototypes in research. The physical agents do not seem to be popular in Europe. However, Chinese and Japanese companies already published a few physical agent products in the market. Nomi [32], Xiaodu [6], and Mochi [11] all have geometric appearance and digital screens for facial expressions. Nomi can access the CAN bus. However, these products have no gestures and act as virtual agents to improve the driving experience. Intelligent Puppet [33] is a comfort robot for babies rather than helping drivers with driving tasks. Kirobo Mini [10], RoBoHoN [2], and NAO [19] are usually applied as humanoid agents in IVA studies [25, 30, 38, 40, 41]. However, Kirobo Mini and RoBoHoN are initially companion robots, and NAO is used for coding education, which means all of the humanoid robots are not designed specifically for driving scenarios. The Affective Intelligent Driving Agent (AIDA) [43, 44] is the first physical agent designed especially for driving scenarios. AIDA can act like a human passenger, communicate with the driver, and help the driver with some tasks. Robot Human-Machine Interface (RHMI) [38] can use eye colour and body motions to remind the driver of a take-over request 5 seconds ahead to prepare. Carvatar [45] is another physical agent aimed at AD scenarios, using facial expressions to convey information and improve trust.

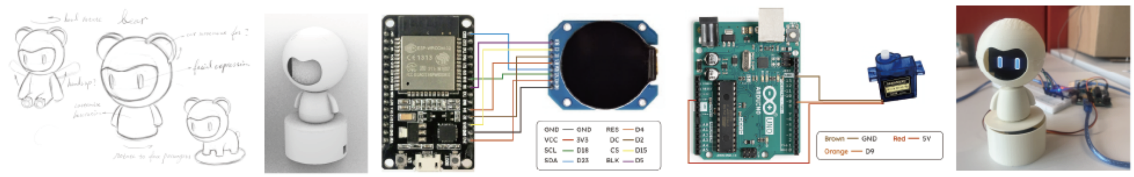
1.2 Interaction with In-Vehicle Agents

Voice interaction is a common communication method for IVAs in SAE Level 3 AD vehicles due to its minimal visual distraction [41]. Research on IVA voice interaction, including speech emotion and gender, indicates that no single voice suits all listeners and situations [21]. Lee et al. found that voice agents aligning with social role stereotypes (informative male and social female) enhance perceived ease of use (PEU) and perceived usefulness (PU) [28]. Jeon et al. showed the effectiveness of an in-vehicle software agent in mitigating effects on driver situation awareness and performance [20]. Ruijten et al. showed that conversational interfaces are more trusted, liked, anthropomorphized, and perceived as more intelligent than graphical UIs [36].

As IVAs evolve from voice-only to physical agents, the interactions become more complex. Both virtual and physical agents can engage in visual interactions, with virtual agents being 2D or 3D characters and physical agents having a physical appearance and facial expressions [14, 18, 23, 38, 43, 45]. However, the interesting thing is except for AIDA published in 2014, other concepts are all under the context of AD.

Gestures are a unique feature of physical agents compared to other agents. The robot developed by Srivatsan et al. [9] shows that robotic objects are a promising technology for enhancing passengers' experience in AVs. RHMI developed by Tanabe et al. [38] can adjust the turning angle, speed, and lid opening angle to inform different levels of emergency: normal state, unstable state, and suspended state.

Social interactions, such as small talk, significantly increase driver trust compared to voice interactions alone [25]. While robot agents can be visually distracting yet increase trust, voice agents are preferred in low-speed situations [41]. Drivers have mixed attitudes toward conversational robot agents [30]. Both voice and robot agents improve likability



(a) Sketch (b) 3D model (c) Circuit ESP32-TFT display (d) Circuit Adruino Uno R3-SG90 (e) Prototype

Fig. 1. The design concept of the robot-like IVA.

and perceived warmth, with voice agents better at anthropomorphism and robot agents offering higher competence and lower workload [40].

IVAs (especially physical IVAs) have significant potential to help with driving tasks and improve the driving experience, as well as a solution to the challenges raised in the AD context. There is a research gap in exploring the advantages and challenges of combining facial expressions and gestures with voice interaction in physical IVAs. This project explores this area. Two research questions were defined: **RQ1:** *How to develop a robot-like IVA for the SAE Level 3 AD scenario?* and **RQ2:** *What are the advantages and challenges of comparing gestures and voice interaction with facial expressions and voice interaction in SAE Level 3 AD scenarios?* In the context of this work, AD is assumed to be SAE Level 3 [37]. A robot-like IVA was designed and developed in this project to answer these two questions.

2 INTERVIEW AND DESIGN OF IN-VEHICLE AGENT

To understand the attitudes and expectations about IVA and driving behaviour in Asian countries and Europe, five participants (5 males, M = 28.8, SD = 3.42) were invited to an interview (see supplementary materials/interview). Four of the participants had experience driving in Europe, and one of the participants had experience driving in both Japan and Europe. Results showed that long-distance driving can be boring and can prompt to get distracted. Even though only one of them had heard of IVA (Nomi of NIO), others were interested in the concept.

The sketch (Figure 1 (a)) presents three modalities, and the middle one was developed further. The face shows expressions and the body rotates to present different gestures according to seven highway scenarios [8] (Figure **??**). The IVA prototype is not a robot that acts independently but a physical form of the whole driving assistant system [30]. Figure 1 (b) shows the 3D model created in Rhino 8 (STL files are in supplementary material). The shell is 3D printed and it contains a 1.28-inch round IPS-TFT display (240*240 pixels, IPS GC9A01) inside the round head (r=31mm) connected to ESP32 (Figure 1 (c)). Gestures are driven by an SG90 servo motor inside the stand connected to Arduino Uno R3 (Figure 1 (d)). No speaker was installed in the prototype because, in the real vehicle, the sound comes from the vehicle's audio system, rather than a physical robot. Figure 1 (e) shows the whole prototype.

The TFT display was connected to an ESP32 board and controlled by the Arduino IDE [3] (v.2.3.2) on Apple Macbook A2442. See supplementary material for code. Five facial expressions (normal, smile, excited, realizing, sad) were designed, shown in Table 1.

To enable the Arduino IDE to run on ESP32, the Arduino core [12] for ESP32 was installed. Libraries Adafruit GC9A01A [1] (v.1.1.1), Adafruit GFX [5] (v.1.11.9), and TFT_eSPI [4] (v.2.5.43) were installed in the Arduino IDE to run the code on the TFT display.

The SG90 servo motor was connected to an Arduino Uno board and controlled by Arduino IDE on the laptop. The library Servo (v. 1.2.1) was installed in Arduino IDE to run the code in the servo motor. Three gestures were designed

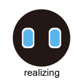
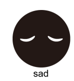
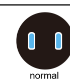
Scenarios	**IVA gestures (GV)**	**Dialogues (FV & GV)**	**Facial expressions (FV)**	**Dialogues (B)**
Greeting	Greeting (gesture)	"Welcome! My name is Eva. Shall we start our trip?" (Driver: Yes) "Here we go!"		
Enter highway	Situation reporting	"We will enter the highway ahead."		"Enter the highway ahead."
Speed limit and speed report		"The speed limit is 90, and right now we are at 87."		"The speed limit ahead is 90, the current speed is 87."
Overtaking	Situation reporting; overtaking (gesture)	"The front car is driving too slow, shall we overtake it?" (Driver: Yes) "Let's do this!" (After overtaking) "WOW, nice!"		
Line changing (construction)	Situation reporting	"Seems there is a construction ahead, we need to change line."		
Congestion	Situation reporting	"Seems there is a traffic jam, we need to slow down."		
Exit highway	Situation reporting	"We will exit the highway ahead."		"Exit the highway ahead."

Table 1. IVA behaviour (gestures, facial expressions, and dialogues) in seven highway scenarios.

in this project according to the scenarios [8] in Table 1: (1) greeting: turn to the driver (starting position), then turn front (100°/s, clockwise) to check the surroundings (66.7°/s, clockwise and counterclockwise) and turn back to the driver (100°/s, counterclockwise); (2) situation reporting: turn front (100°/s, clockwise) and turn to the driver (100°/s, counterclockwise); (3) overtaking after got permission: turn front and rotate to face the vehicle be overtaken (100°/s, clockwise, only 30 degrees with SG90), then turn back to the driver (100°/s, counterclockwise).

3 METHOD OF EXPERIMENT

An experiment was conducted to evaluate the design. The experiment had three groups: Group *B* (baseline), Group *FV* (facial expressions and voice), and Group *GV* (gestures and voice). The behaviour of IVA in different groups is shown in Table 1. *B* as a baseline only had robotic voice interaction, which made it sound like a conventional in-vehicle navigation system and convey limited information. Thus *B* presented the Tesla Full Self-Driving (supervised) driving-assistance system. All the audio was generated from PlayHT [34] and was edited as another soundtrack in a 4.5-minute video recorded in GTA V. The study was approved by the Ethical Review Board of Eindhoven University of Technology and participants gave their informed consent to use their data.

The videos of scenarios were recorded in the GTA V video game [35] running on a Windows PC according to Table 1, and the highway route is chosen from downtown to Beeker's Garage. To get an inside view of AD, two mods were

Fig. 2. Experimental setup.

applied: (1) Dynamic Vehicle First Person Camera Mod [15], allowing the camera inside the vehicle to get the driver's perspective and (2) Enhanced Native Trainer Mod [42], which makes characters invisible (i.e., no hands holding the steering wheel were visible, providing a sense of driving in an AV).

A total of 12 participants (age: M = 27.42, SD = 2.11; 7 females and 5 males) from Eindhoven University of Technology joined the user test through the user test link posted on the social media platform. And no financial inducement was offered for the user test. All of the participants were over 18 years old and had driver's licenses (issued in different countries). Three participants had experience in driving with Tesla autopilot. Figure 2 shows the experimental setup. A screen (RCA RS32F3), headphones (Sennheiser MOMENTUM 4), and the robot-like IVA prototype were connected to the laptop (Apple Macbook A2442). For each participant, the lowest point of the prototype was adjusted by stacking up books (5.5 cm from the desk surface) until the participant could see the whole TFT display. The position of the robot-like IVA prototype is settled on the front right of the participant, corresponding to the position above the dashboard in a real car.

The author briefly introduced the background information about SAE Level 3 AD to the participants. Next, the participants took a seat and had three groups of tasks to complete: *B* , *FV* and *GV*. *B* was a baseline and was always first but for half of the participants, the sequence of *FV* and *GV* was switched. The prototype was controlled by the author during the experiment. After each group of tasks, participants were asked to fill in the NASA Task Load Index scale [17] to measure the workload and the acceptance scale [39] to measure overall experience on an iPad. Finally, a semi-structured interview was conducted to collect the user test experience. During each group of tasks, participants were asked to imagine themselves in the SAE Level 3 AV and do their daily work as a secondary task (either replying to messages, watching videos on a mobile phone/iPad, or reading a book). They were allowed to look up and check the

Table 2. Results from the NASA TLX scale [17].

	B M(SD)	FV M(SD)	GV M(SD)
Mental demand (%)	34 (23)	24 (26)	20 (18)
Physical demand (%)	33 (27)	28 (28)	11 (12)
Temporal demand (%)	21 (18)	21 (22)	15 (13)
Performance (%)	34 (27)	22 (24)	17 (13)
Effort (%)	28 (25)	22 (25)	25 (21)
Frustration (%)	48 (28)	19 (16)	19 (15)
Average (%)	33 (21)	23 (24)	18 (14)

Note: B=Baseline, FV=Facial expressions and voice, GV=Gestures and voice.

situation at any time. If they felt that they wanted to take over the control immediately, they were asked to inform the author about it.

The experiment interview was analyzed through thematic analysis. The themes were generated after coding the data in the transcription.

4 RESULTS OF EXPERIMENT

The workload scores (Table 2) of *FV* (M=23, SD=24) and *GV* (M=18, SD=14) were both less than *B* (M=33, SD=21), and *GV* had the lowest workload score among the three groups. For the dimension of Physical demand, the workload score of *GV* (M=20, SD=18) was around half of *B* (M=34, SD=23). Comparing *FV* and *GV* separately, *GV* had lower workload scores than *FV* in the other five dimensions except Effort, as well as lower standard deviation values in all dimensions. However, *GV* (M=25, SD=21) got a higher workload score than *FV* (M=22, SD=25) in the Effort dimension. And *FV* has almost the same Temporal demand as *B*.

Table 3 shows the usefulness and satisfaction scores of each participant for *B*, *FV*, and *GV*. Both *FV* and GV had higher overall usefulness and satisfaction scores than *B*, and *FV* got the highest in both usefulness and satisfaction among all. Except for Annoying-Nice, *FV* got higher or equal scores compared to *GV*, as well as lower or equal standard deviation for all dimensions. Additionally, *GV* got scores far lower (over 0.5) than *FV* in the Unpleasant-Pleasant and Sleep-inducing-Raising Alertness dimensions.

According to the results of the experiment interview (see supplementary materials), 7 participants preferred *GV* (gestures and voice), 5 participants preferred *FV* (facial expressions and voice), and no one preferred *B* (baseline). The reason for choosing gestures could be summarized as follows: (1) they have better perception than facial expressions (P1, P2, P3, P6, P8); (2) gestures move before the voice conveys information, providing more time to get out of the work and concentrate on the road situation (P1, P11); (3) facial expression make people distracted (P8); (4) understand facial expressions needs time (P1, P2, P8). The others who chose facial expressions suggested: (1) facial expressions can provide more emotional support than gestures (P2, P4, P5, P10); (2) Facial expressions do not have the noise of rotating (P7); (3) cannot understand the meaning of gestures (P12). Details of the interview thematic analysis are shown in Table 4. To sum up, four main themes were concluded: (1) perception (not just visual), efficiency, trust issues and emotional support. Although *B* could be perceived by the user, it still needs to provide more information to explain the current status. This is also related to the trust of the system. (2) *FV* works better in emotional support than *GV*, however, it's

Table 3. Results from the acceptance scale [39].

Negative (-2)	Positive (+2)	B M(SD)	FV M(SD)	GV M(SD)
Useless	Useful	1.00 (1.04)	1.33 (0.78)	1.08 (1.16)
Unpleasant	Pleasant	0.67 (0.98)	1.17 (0.39)	1.08 (0.67)
Bad	Good	0.83 (0.94)	1.25 (0.45)	1.08 (0.79)
Annoying	Nice	1.08 (0.67)	1.25 (0.62)	1.33 (0.65)
Superfluous	Effective	0.92 (1.00)	1.25 (0.75)	1.25 (0.75)
Irritating	Likeable	0.67 (0.78)	1.08 (0.79)	0.83 (1.03)
Worthless	Assisting	1.00 (0.95)	1.17 (0.58)	0.92 (0.90)
Undesirable	Desirable	1.00 (0.60)	1.17 (0.83)	0.83 (1.19)
Sleep-inducing	Raising Alertness	-0.33 (0.89)	0.75 (0.75)	0.17 (1.27)
Overall usefulness score		0.68 (0.72)	1.15 (0.48)	0.90 (0.82)
Overall satisfaction score		0.85 (0.61)	1.17 (0.59)	1.02 (0.79)

Note: B=Baseline, FV=Facial expressions and voice, GV=Gestures and voice.

hard for users to notice and understand the facial expressions in a short time. (3) *GV* has a higher perception than *FV* and *B*, but it is hard to understand the meaning and a little boring. (4) All of the groups have trust concerns.

Table 4. Thematic analysis of the interview.

Group	**Codes**	**Themes**	**Participants**	**Support**
B	As a reminder	Perception	P1, P6, P10, P11	P1: "Mostly looked up when it reminded me through the voice." P6: "I look up because of my habit and the voice information." P10: "Most of the time I just looked up due to the voice." P11: "Voice reminders."
B	Provide information	Information transmission	P2	P2: "When the voice gave some information."
B	Cause distraction or miss information	Efficiency	P1, P9	P1: "Sometimes I will be distracted and miss the information from the voice." P9: "Sometimes I just ignore it and it won't say again when I focus on other things."

Group	Codes	Themes	Participants	Support
B	More explanation needed	Efficiency	P3, P5, P9	P3: "But the baseline group gave less information." P5: "The baseline changed the line too fast and there is no information in advance." P9: "The voice is not enough for me."
FV	Time-consuming	Efficiency	P1	P1: "Actually I won't look at the facial expressions, because for me it's time-consuming and I can get nothing useful."
FV	Cause distraction	Efficiency	P8	P8: "The expressions could make me distracted."
FV	Hard to understand	Efficiency	P1, P2, P8	P1: "I can get nothing useful." P2: "I cannot receive information for the face." P8: "I would think about what the expression means and why it was changing."
FV	Cute, interesting, comforting	Emotional support	P2, P4, P10	P2: "Only when there is an emergency, and the face can comfort my feelings." P4:"But the expression is cuter to me" P10:"But expressions are more interesting for me."
FV	Intuitive	Emotional support	P5	P5: "The expressions are more Intuitive."

Group	Codes	Themes	Participants	Support
FV	Hard to notice	Perception	P2, P3, P4, P9, P11, P12	P2: "I cannot receive information for the face." P3: "I cannot notice the face." P4: "Though sometimes it's hard to notice." P9: "Expressions are not so easy to notice, especially when doing something." P11: "If I focus on my work, the expression doesn't work for me." P12: "But I think both of them are hard to notice."
GV	As a reminder	Perception	P1, P3, P8, P9, P11	P1: "The gesture reminds me of something that is going on." P3: "It can remind me that there is something happening before the voice." P8: "Just inform me it's moving through it's noise." P9: "The gestures can give me more reminders and concentration." P11: "Because the robot will rotate as the vehicle moves, its movement is related to surroundings which will give a sense of leading."
GV	Hard to notice	Perception	P11	P12: "But I think both of them are hard to notice."

Group	Codes	Themes	Participants	Support
GV	Easy to notice	Perception	P1, P2, P3, P6, P8	P1: "There is something moving rather than the noise of the servo motor that reminds me." P2: "I did notice the movement." P3: "But gesture I can notice it from peripheral vision. It can remind me that there is something happening before the voice." P6: "But for rotation of gesture, I can feel it from my peripheral vision." P8: "The gestures won't give me too much information, just inform me it's moving through its noise."
GV	Boring	Emotional support	P5	P5: "The gesture of rotating is a little boring."
GV	Cause distraction	Efficiency	P7	P7: "Because I don't like the noise made when rotating. "
GV	Hard to understand	Efficiency	P12	P12: "I cannot understand the meaning of the gestures."
All Groups	Trust issue		P1, P3, P5, P10	P1: "But maybe when using it more, the time for looking up will reduce and the trust will increase." P3: "The autopilot technology is not mature enough, so I don't trust it fully." P5: "The baseline changed the line too fast and there is no information in advance." P10: "I actually don't trust the system very much."

5 DISCUSSION

We developed a robot-like IVA capable of voice interactions for an SAE Level 3 AV with five facial expressions and three gestures and evaluated it in an experiment.

There were notable results. (1) Both interactions of facial expressions and gestures can reduce workload in an SAE Level 3 AD scenario, and increase the usefulness and satisfaction of the driver. Both *FV* and *GV* were effective in the reduction of workload, and the effect of GV was better than FV. Furthermore, GV greatly reduced the workload of Physical demand. The reason may be that the gestures were always triggered before voice interaction, and can be easily noticed by the participants, which leaves some time for them to get out of their work and focus on the road. The facial expression was shown at the same time as the voice was played, which may have caused the participants to check both road situations and expressions, resulting in a higher score of Temporal demand. As for the great reduction in Frustration, probably because IVA provide a sense of companionship, either through voice interaction, facial expressions or gestures. On the other hand, the acceptance scale shows better results in FV than GV, even though both groups can improve usefulness and satisfaction. This may indicate that gestures work better in reducing the workload (functionally), and facial expressions work better in enhancing usefulness and satisfaction, providing more affective support (emotionally). Results from the thematic analysis of the interview showed that: (1) Participants who preferred gestures also indicated that gestures could remind them that something was going to happen before the voice informed them about it; while participants who preferred facial expressions argued that expressions were more intuitive (P5), comforting (P2) and cute (P4). (2) Though voice interaction is a more efficient way for an IVA to convey information, it is still not enough. Challenges could be missing information (P1) or needing more explanation (P3, P5, P9), and gestures can provide more time to get out of the secondary task and concentrate on the traffic situation. (3) Gestures seem to be more functional and preferred by the driver while facial expressions are more emotional and preferred by passengers. (4) Gestures are easier to notice but hard to understand independently and facial expressions are the opposite. (5) Users' concerns about physical IVA could be classified into four aspects: perception (not just visual), efficiency, trust issues and emotional support.

After the experiment, two engineers from Nissan Co. were interviewed to discuss the project from a vehicle manufacturer's perspective. They noted that installing physical IVAs in vehicles is challenging, especially if connected to the CAN bus. Privacy concerns arise if an IVA accesses vehicle functions, and the IVA's position must be considered to prevent injuries during airbag deployment.

The secondary task was not defined in the experiment because people have different driving habits. However, some people would look at the view outside while others were reading a paper. They had different levels of commitment to the secondary task, which may have led to errors. Different secondary tasks and different sitting postures also influence the participants' field of view. That is why some participants could easily notice the IVA while others could not. Different driving modes of IVA could be defined to suit different workloads of secondary tasks. The experiment was conducted with a video, rather than in a real vehicle. Two participants (P10, P12) mentioned that they may have acted differently if they could have felt the acceleration and deceleration of the vehicle. Since exposure to each group was only 4.5 minutes per participant, it is hard to predict if participants would get bored or fall asleep in case of extended duration. Some participants were curious about the video and always looked up in all groups. Even switching FV and GV to reduce the error, they knew what would happen when they tested FV and GV.

For future work, combining facial expressions and gestures could enhance the concept. Designing more intuitive gestures and 3D facial expressions is also recommended. Integrating IVA with other in-vehicle human-machine interfaces could make IVA the manager of all in-vehicle communication. Since the study method is Wizard of Oz, user tests in a working system are suggested to have more precise results. Different driving modes should be defined based on participant feedback. Different appearances and sizes of IVA might also make a difference to the workload, satisfaction and usability. Furthermore, different driving modes have different degrees of impact on SAE level [37], which level of automation benefits the most would also be interesting to explore in the future. Additionally, exploring IVA's potential in interacting with vulnerable road users (VRUs) like cyclists and pedestrians is suggested. The IVA was placed above the dashboard, where it can also be visible to people outside. So it could convey information to them by gestures and facial expressions, aiding in interactions with VRUs [7]. On the other hand, the physical IVA will have a significant impact on safety in a car accident, so a protection chamber in the dashboard will be considered in future work.

6 SUPPLEMENTARY MATERIAL

Interview, STL files, analysis and Arduino code, materials used in the experiment, and raw data can be found at: https://www.dropbox.com/scl/fo/8xz3ok1s4zsagf7nytky5/AJQPehMbzmQAZ8ncz3LqjfQ?rlkey=25dct1vyd3dzqyxyvihy34h4u&st=zu8ty1mn.

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