DCM220 Study Guide

Conversational Design with Multi-Modalities: (Apr.- Jun. 2023)

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Introduction

Nowadays, we are confronting various new machines equipped with intelligence, and they can interact with us socially. Social robots, voice user interfaces, and chatbots are such examples. They show a lot of promise in using conversational interaction to simplify and amplify our everyday personal and professional lives. However, conversational design is more than creating interfaces that can talk or chat. A good conversation is more than an exchange of phrases. It begins with an unspoken agreement and succeeds with cooperation toward a goal. The primary interest of this course is to explore design principles and use them to design intuitive interactions with digital systems and whether a system can use the proper modalities to fit the contexts and activities. Informed by HCI studies on human-human conversations, we already knew that there are essential qualities of a good conversation, including *Goal-oriented*, *Cooperative, Context-aware, Quick and straightforward, Turn-based, Truthful, Polite*, and *Error-tolerant*. In the first part of the course, students will study to understand those conversational qualities and individually develop interaction concepts with a chosen modality, such as voice, text, gesture, haptic, or tangible. The designed interactions should embody the qualities that fit usage scenarios. In the second part, students will use the interaction-attention continuum (Bakker & Niemantsverdriet, 2016) to analyze the interaction flow in a broader everyday context. Based on the analysis, students will expand the interaction to provide seamless experiences connecting the conversations from one modality to another. This exercise is beneficial because an intelligent system will continuously grow with newly added devices and agents. Designers need a holistic view of how the conversation could fluently switch among agents with alternative modalities. In this way, designers will create seamless conversational interactions to help people reach their goals easily and efficiently.

Relevant Courses

1. Embodying intelligent behavior in social contexts (DBM140)
2. Interactive materiality (DCM160)
3. The sound of smart things (DCM180)

Learning Objectives

This course aims to enhance students' competencies in the following two expertise areas: (1) Creativity and Aesthetics, (2) Technology and Realization. The teaching program will introduce and discuss related theories and methods of designing conversational interactions. Students will apply learned knowledge with the term project and reflect on their practice to improve their design attitude, skill, and understanding. Overall, we break down the goal into the following six objectives. For every lecture and assignment, students can see the mark of the relevant objectives.

1. Understanding the essential qualities of a successful conversational design.
2. Using the methodological and theoretical knowledge of analyzing conversations and creating interaction designs.

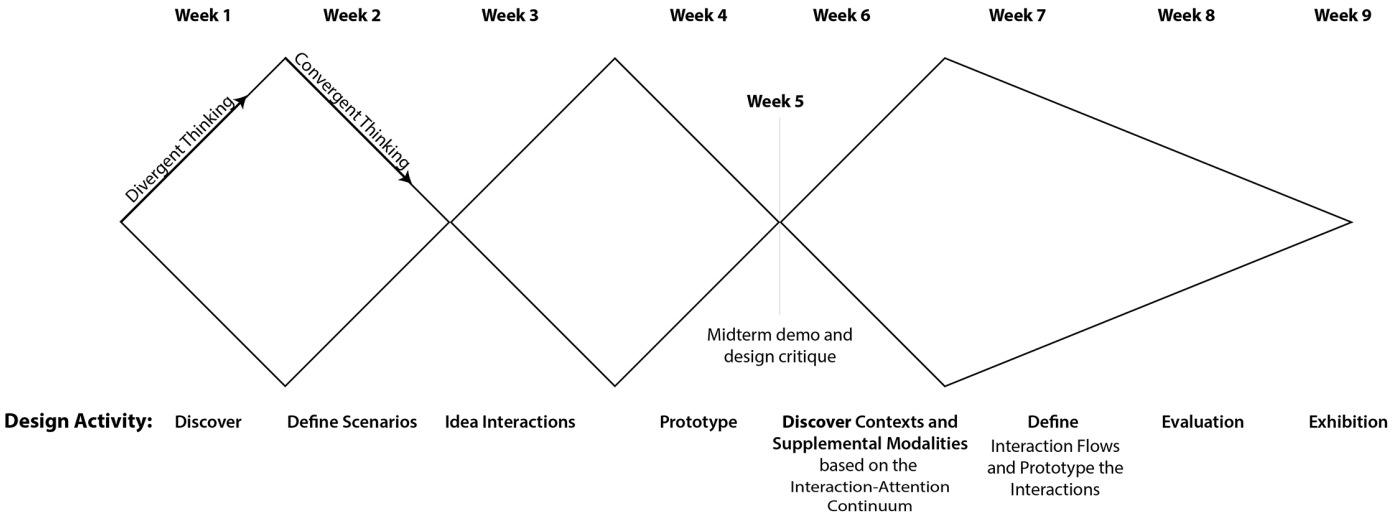
3. Embodying the conversational qualities in creating proper designs that can fit the interaction context.
4. Describing differences between modalities and benefits of multi-modal feedback.
5. Creating appropriate user experiences in switching the conversations through different modalities.
6. Using AI prototyping tools in crafting good designs with aesthetic qualities.

Course Setup

One assignment will be published on Canvas one week before the first meeting. You will be asked to indicate your preference for the projects before the deadline mentioned in the announcement. After receiving students' registrations, you will be assigned to groups by the course coordinator. The allocation will be published in Canvas before the first meeting. In the first week of the quartile, you can start the project work immediately. The initial design challenges were described in the *Project Description* section on pp. 6-9.

Course Schedule and Deliverables

In this course, students will learn several design principles and techniques for creating appropriate experiences of conversational designs. Students will also read literature and apply all the knowledge through practicing with a design project. To empower students' learning-by-doing practice, we integrate the user-center-design and double-diamond process with the weekly topics and assignments. The overall program is presented in the following diagram, followed by the descriptions of the weekly teaching plan. The logistic info can be found on https://canvas.tue.nl/courses/21756/pages/schedule



Week 1 Introduction of Conversational Design and Discovering Use Cases

In the first week, we will examine the existing conversational products and discuss the challenges of designing natural and engaging experiences. Based on that, we will use academic research findings to introduce the theories students will learn from this course to create conversational design concepts that could deliver remarkable user experiences fitting the usage contexts. Students will conduct a needed study to develop scenarios and design requirements in week two as the basis for ideating their design concepts with two iterations.

Key Literature

1. Hall, E. (2018). *Conversational design*. The eBook is available: https://tue.on.worldcat.org/oclc/1038802010

2. Cila, N. (2022). Designing human-agent collaborations: Commitment, responsiveness, and support. https://doi.org/10.1145/3491102.3517500
3. Clark et al. (2019). What makes a good conversation? Challenges in designing truly conversational agents. https://doi.org/10.1145/3290605.3300705
4. Lee, M. (2020). Speech acts redux: Beyond request-response interactions. https://doi.org/10.1145/3405755.3406124

Other Resources:

- Introduction of conversation design: https://developers.google.com/assistant/conversation-design/welcome
- Design Principles: https://developers.google.com/assistant/conversation-design/learn-about-conversation

Assignment 1a: Conducting ethnographic interviews to understand usage cases of the chosen design challenge. Define the usage contexts, and draft the scenarios and possible (alternative) conversations.

Learning Goals Addressed: L1 and L2

Week 2: Defining the Flow and Dialogs of Conversational Interactions

In the second week, students will present the scenarios of particular use cases and the corresponding conversational interaction requirements between human users and design artifacts. Students will identify the goals of the interactions and sketch the conversation flow with scripts and storyboards. We will introduce the conversation patterns to help students consider possible situations and design corresponding interactions to avoid bad user experiences. For instance, how to apologize to users when the system cannot understand users' intents or is unable to fulfill users' requests.

Key Literature

1. Chaves, P. A., & Gerosa, A. M. (2021). How should my chatbot interact? A survey on social characteristics in human–chatbot interaction design. https://doi.org/10.1080/10447318.2020.1841438
2. Chuang, Y., Chen, L. -L., & Liu, Y. (2018). Design vocabulary for human–IoT systems communication. In *Proceedings of the SIGCHI conference on human factors in computing systems* (Paper No. 274). ACM. https://doi.org/10.1145/3173574.3173848
3. Rozendaal, M. (2016). Objects with intent: A new paradigm for interaction design. *Interactions, 23*(3), 62–65. https://doi.org/10.1145/2911330

Methods: Bodystorming and role play.

Assignment 1b: Write sample dialogs.

- Example: https://developers.google.com/assistant/conversation-design/write-sample-dialogs
- Example: https://www.frankwatching.com/archive/2016/12/29/conversational-ux-zo-ontwerp-je-in-4-stappen-conversaties-voor-chatbots/

Learning Goals Addressed: L1 and L2

Week 3&4: Ideation and Prototyping

Before the midterm, students will choose a primary modality to design the main conversational interaction based on the blueprint document. We will give students a tutorial on Google's DialogueFlow system and teach students how to use Google Cloud to develop interactive prototypes. This platform provides rich documentation, video tutorials, and broad interoperability with other platforms and physical computing. Students can check the introduction video (https://cloud.google.com/dialogflow/cx/docs/video) and quick start tutorial (https://cloud.google.com/dialogflow/cx/docs/basics).

Assignment 2 (due in week 5): Interactive conversational design with a chosen modality.

Learning Goals Addressed: L3 and L6

Week 5: Midterm Exhibition and Design Critique

We will organize a demoday setup as a midterm exhibition for coaches and peers to try students' prototypes and give each other constructive feedback.

Learning Goals Addressed: L2

Week 6: Extending the Interaction Flows with the Interaction-attention Continuum

Our everyday contexts are filled with peripheral or implicit interactions: we can easily drink coffee from a cup while watching the news and are constantly aware of the weather without looking through the windows. Similarly, many of our everyday interactions take place in a social context, whereas most designed interactions are aimed at single users. In the second part of this course, we will use the interaction-attention continuum (Bakker & Niemantsverdriet, 2016) to analyze the interaction flow in a broader view of the intended activity. Students will discover secondary modalities that can interoperate with the first concept and switch users' attentions for continuous conversation that fits the usage contexts. For instance, when a user is driving the car and talking to other passengers, they might overhear the agent's voice conversation. If there is a necessary action that needs the user's full attention, the system can use visual or haptic feedback to inform them to take proper action. Some other examples are that the agents want to convert information that is not crucial in the particular context.

Key Literature

1. Bakker, S., & Niemantsverdriet, K. (2016). The interaction-attention continuum: Considering various levels of human attention in interaction design. *International Journal of Design, 10*(2), 1-14. http://www.ijdesign.org/index.php/IJDesign/article/view/2341
2. Zheng, Q., Tang, Y., Liu, Y., Liu, W., & Huang, Y. (2022). UX research on conversational human-AI interaction: A literature review of the ACM digital library. In *Proceedings of the SIGCHI conference on human factors in computing systems* (Article No. 570). ACM. https://doi.org/10.1145/3491102.3501855

Assignment 3: Develop sample dialogs and interaction flows with at least one more modality.

Learning Goals Addressed: L4 and L5

Week 7: Advanced Prototyping Techniques

When students expand the conversational interaction with multiple modalities, it is very likely that the data might be transmitted from one module to the other to trigger specific interactions. We will introduce some connectivity mechanisms to teach students how to use the APIs to get and receive the data and process it with the processors.

Assignment 4 (due in week 9): Develop scenarios and ideas to enrich the interactive conversational design with at least one more modality.

Learning Goals Addressed: L5 and L6

Week 8: Design Evaluation

At the end of the course, we ask students to evaluate their design concepts with at least 10 target users. Students will also use suitable methods (e.g., thematic analysis) to analyze users' feedback to draw conclusions. We will use some case studies to show diverse evaluation approaches students can apply to their projects.

Learning Goals Addressed: L1 and L2

Week 9: Final Exhibition and Presentation

We plan to organize a demoday exhibition to facilitate everyone trying all teams' design concepts and give each other valuable feedback and comments. Students will synthesize those feedback to critique their final design demonstrators and write up the conclusions as well as their reflections.

Assignment 4: Report (including final design, user evaluation, findings, discussions, and conclusions)

Project Description

This year we selected Mobility and Smarthome domains to define several initial design challenges for students to explore with their design projects.

In-vehicle Conversational Interaction Design

Background

In 2020, 18,800 people died in traffic in the EU. It is urgent to make sure that our modern and especially future vehicles operate safely. There are many manual vehicles of all kinds and shapes on our roads already today. One of the ideas to optimize traffic is the introduction of automated vehicles (AVs). Automated vehicles (AVs) may soon be driving on public roads. In such vehicles, the driver might be busy with a non-driving task (Levels 3 and 4) or entirely absent (Level 5)(SAE, 2013). The deployment of AVs will be gradual, with decades before fully automated vehicles will be driving on public roads. However, AVs with a human driver available to take over control in case the automated system exceeds its working envelope are expected to be deployed in the coming years (Kyriakidiset al., 2015). Consequently, in the foreseeable future, we will encounter mixed traffic of manually-driven cars, AVs in either automated or manual mode, and VRUs, such as pedestrians and cyclists.

Because humans in an AV may be engaged in a non-driving task, the traditional ways of human-human interaction will not be applicable. New questions about the communication and cooperation between AVs and VRUs arise (Boeret al., 2015). Communication between drivers and AVs is important, too. Today, drivers of manual cars communicate with other road users, for example, by early stopping to indicate right-of-way or through eye contact, hand gestures, and head movements. A driver may be asked to take back control of an AV using a take-over request (TOR, Bazilinskyyet al., 2017a, 2017b, 2018). Providing a well-design TOR is safety-critical, as not taking back the control within the given time envelope may be fatal. We want students to explore design concepts with multimodal interactions (Braun et al., 2017).

Design/research question 1: Voice-based control of in-cabin ambient light.

In an SAE level 5 AV, a driver will become a passenger. Such a passenger may then be sitting too far from the vehicle's control panel. It is already happening today, where, for example, new models of Maybach feature passenger seats, which come with a separate tablet to control various aspects of the passenger area (as the passenger is too far from the panel in front). One thing that the passenger may wish to control is the light in the ambient vehicle. A conversational interface is a logical option to control ambient light. Moreover, in this design challenge, you will explore how to arrange it.

Design/research question 2: Highlighting relevant UI elements based on voice commands.

A passenger in both a manual vehicle and an AV may use voice to control UI elements. For example, voice could be used to show the weather or play media on the main display inside of the vehicle. In this design challenge, you will explore how to support such functionality using a conversational interface.

Relevant literature

1. Braun, M., Broy, N., Pfleging, B., & Alt, F. (2017). A design space for conversational in-vehicle information systems. In *Proceedings of the 19th international conference on human-computer interaction with mobile devices and services* (Article No. 79). ACM. https://doi.org/10.1145/3098279.3122122
2. Bazilinskyy, P., Kyriakidis, M., & De Winter, J. C. F. (2015). An international crowdsourcing study into people's statements on fully automated driving. *Procedia Manufacturing, 3*, 2534–2542.

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4. Bazilinskyy, P., & De Winter, J. C. F. (2015). Auditory interfaces in automated driving: An international survey. *PeerJ Computer Science, 1*, e13. https://doi.org/10.7717/peerj-cs.13
5. Bazilinskyy, P., & De Winter, J. C. F. (2017a). Analyzing crowdsourced ratings of speech-based take-over requests for automated driving. *Applied Ergonomics, 64*, 56–64. https://doi.org/10.1016/j.apergo.2017.05.001
6. Bazilinskyy, P., Eriksson, A., Petermeijer, S. M., & De Winter, J. C. F. (2017b). Usefulness and satisfaction of take-over requests for highly automated driving. In *Proceedings of Road Safety and Simulation Conference*. https://research.tudelft.nl/en/publications/usefulness-and-satisfaction-of-take-over-requests-for-highly-auto
7. Bazilinskyy, P., Petermeijer, S. M., Petrovych, V., Dodou, D., & De Winter, J. C. F. (2018). Take-over requests in highly automated driving: A crowdsourcing survey on auditory, vibrotactile, and visual displays. *Transportation Research Part F: Traffic Psychology and Behaviour, 56*, 82–98. https://doi.org/10.1016/j.trf.2018.04.001
8. Boer, E. R., Penna, M. Della, Utz, H., Pedersen, L., & Sierhuis, M. (2015). *The role of driving simulators in developing and evaluating autonomous vehicles*. Paper presented at the Driving Simulation Conference & Exhibition Europe, Tübingen, Germany.
9. Kyriakidis, M., Happee, R., & De Winter, J. C. F. (2015). Public opinion on automated driving: Results of an international questionnaire among 5,000 respondents. *Transportation Research Part F: Traffic Psychology and Behaviour, 32*, 127-140. https://dx.doi.org/10.2139/ssrn.2506579
10. SAE. (2013). SAE levels of driving automation. http://www.sae.org/misc/pdfs/automated_driving.pdf

The description of the **SmartHome topics**

Designing the Conversational Interactions for Smarthome Contexts

Background

Smarthome is an expanding domain in research as well as the consumer market. According to Statista's marketing research, the number of active households is expected to reach 672 million by 2027. Google, Amazon, and Apple are the three most prominent service providers that use their virtual assistant technology to empower users' interaction with their smarthome and IoT devices. However, the existing applications were limited to rule-based functionalities (e.g., IFTTT) and remote controls with voice or mobile devices. Empowering with the emergent artificial intelligence capabilities, we envision that the smarthome can initiate conversations with users to understand their needs and provide valuable services tailored to the circumstances. For instance, due to the increased cases of extreme weather or disturbance of public transportation caused by drivers' strikes, users probably want different temperature and atmosphere settings that can perfectly accommodate their moods. When the smarthome agent senses inhabitants coming home, they can first greet users and discuss with users to adjust the settings they anticipated with users' past behaviors and the environmental data.

In our previous project, we made a concept video to anticipate how this user-smarthome interaction could be designed and used in future everyday life: https://youtu.be/RDgTjYb2MBI. Based on this design vision, we identified the following five themes the smarthome system needs to interact with human users explicitly or implicitly.

Design Objective

As a practice of this elective project, we ask students to pick one or more themes from this vision video to formulate their project. This can help students establish concrete scenarios to develop suitable conversational interactions within a quartile. We want students to apply learned knowledge and skills to create designs that fit the contexts with appropriate user experiences. In the following related works, we collected several interesting design and research works for helping students investigate the design challenges to define their own design brief and eventually create an innovative design concept.

Related Works

1. Chuang, Y. (2020). Designing the expressivity of multiple smart things for intuitive and unobtrusive interactions. In *Proceedings of the ACM conference on designing interactive systems* (pp. 2007-2019). ACM. https://doi.org/10.1145/3357236.3395450
2. Chuang, Y., Lee, Y.-H., & Chen, L.-L. (2015). Envisioning a smart home that can learn and negotiate the needs of multiple users. In *Extended abstracts of the international joint conference on pervasive and ubiquitous computing* (pp. 237-240). ACM. https://doi.org/10.1145/2800835.2800934
3. Niemantsverdriet, K., Essen, H., & Eggen, B. (2017). A perspective on multi-user interaction design based on an understanding of domestic lighting conflicts. *Personal and Ubiquitous Computing, 21*(2), 371-389. https://doi.org/10.1007/s00779-016-0998-5
4. Mennicken, S., Vermeulen, J., & Huang, E. M. (2014). From today's augmented houses to tomorrow's smart homes: New directions for home automation research. In *Proceedings of the ACM international joint conference on pervasive and ubiquitous computing* (pp. 105-115). https://doi.org/10.1145/2632048.2636076
5. Norman, D. (2007). Communicating with our machines. In D. Norman, *The design of future things* (pp. 135-154). Basic Books. https://tue.on.worldcat.org/oclc/148914518
6. Porcheron, M., Fischer, J. E., Reeves, S., & Sharples, S. (2018). Voice interfaces in everyday life. In *Proceedings of the SIGCHI conference on human factors in computing systems* (Paper No., 640). ACM. https://doi.org/10.1145/3173574.3174214
7. Reddy, A., Kocaballi, A. B., Nicenboim, I., Søndergaard, M. L. J., Lupetti, M. L., Key, C., Speed, C., Lockton, D., Giaccardi, E., Grommé, F., Robbins, H., Primlani, N., Yurman, P., Sumartojo, S., Phan, T., Bedö, V., & Strengers, Y. (2021). Making everyday things talk: Speculative conversations into the future of voice interfaces at home. In Extended abstracts of the SIGCHI conference on human factors in computing systems (Article No. 23). ACM. https://doi.org/10.1145/3411763.3450390
8. Rogers, J., Clarke, L., Skelly, M., Taylor, N., Thomas, P., Thorne, M., Larsen, S., Odrozek, K., Kloiber, J., Bihr, P., Jain, A., Arden, J., & von Grafenstein, M. (2019). Our Friends Electric: Reflections on Advocacy and Design Research for the Voice Enabled Internet. In *Proceedings of the SIGCHI conference on human factors in computing systems* (Article 114). ACM. https://doi.org/10.1145/3290605.3300344
9. Xiao, Z., Mennicken, S., Huber, B., Shonkoff, A., & Thom, J. (2021). Let me ask you this: How can a voice assistant elicit explicit user feedback? In *Proceedings of the ACM Conference on Human-Computer Interaction, 5*(CSCW2), Article 388. https://doi.org/10.1145/3479532
10. Yang, R., & Newman, M. W. (2013). Learning from a learning thermostat: Lessons for intelligent systems for the home. *Proceedings of the ACM international joint conference on pervasive and ubiquitous computing* (pp. 93-102). ACM. https://doi.org/10.1145/2493432.2493489

Mandatory Reading of the Elective

1. Bakker, S., & Niemantsverdriet, K. (2016). The interaction-attention continuum: Considering various levels of human attention in interaction design. *International Journal of Design, 10*(2), 1-14. http://www.ijdesign.org/index.php/IJDesign/article/view/2341

2. Cila, N. (2022). Designing human-agent collaborations: Commitment, responsiveness, and support. In *Proceedings of the ACM SIGCHI conference on human factors in computing systems* (Article No. 420). https://doi.org/10.1145/3491102.3517500

3. Chuang, Y., Chen, L. -L., & Liu, Y. (2018). Design vocabulary for human–IoT systems communication. In *Proceedings of the SIGCHI conference on human factors in computing systems* (Paper No. 274). ACM. https://doi.org/10.1145/3173574.3173848

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6. Hall, E. (2018). *Conversational design*. A Book Apart. https://tue.on.worldcat.org/oclc/1038802010

7. Lee, M. (2020). Speech acts redux: Beyond request-response interactions. In *Proceedings of the 2nd conference on conversational user interfaces* (Article No. 13). ACM. https://doi.org/10.1145/3405755.3406124

8. Rozendaal, M. (2016). Objects with intent: A new paradigm for interaction design. *Interactions, 23*(3), 62–65. https://doi.org/10.1145/2911330

Design Case

1. Marenko, B., & van Allen, P. (2016). Animistic design: How to reimagine digital interaction between the human and the nonhuman. *Digital Creativity, 27*(1), 52–70. https://doi.org/10.1080/14626268.2016.1145127
2. Ng, R. S., Kandala, R., Marie-Foley, S., Lo, D., Steenson, M. W., & Lee, A. S. (2016). Expressing intent: An exploration of rich interactions. In *Proceedings of the 10th international conference on tangible, embedded, and embodied interaction* (pp. 524–531). https://doi.org/10.1145/2839462.2856526
3. Rinott, M., Geiger, S., Nenner, N., Topaz, O., Karmon, A., & Blake, K. (2021). Designing an embodied conversational agent for a learning space. Designing Interactive Systems Conference 2021, 1324–1335. https://doi.org/10.1145/3461778.3462108
4. Rogers, J., Clarke, L., Skelly, M., Taylor, N., Thomas, P., Thorne, M., Larsen, S., Odrozek, K., Kloiber, J., Bihr, P., Jain, A., Arden, J., & von Grafenstein, M. (2019). Our friends electric: Reflections on advocacy and design research for the voice-enabled Internet. In *Proceedings of the SIGCHI conference on human factors in computing systems* (Paper No., 114). ACM. https://doi.org/10.1145/3290605.3300344

5. van Allen, P., McVeigh-Schultz, J., Brown, B., Kim, H. M., & Lara, D. (2013). AniThings: Animism and heterogeneous multiplicity. In *Extended abstracts of the SIGCHI conference on human factors in computing systems* (pp. 2247–2256). https://doi.org/10.1145/2468356.2468746

PodCast

- **RoboPsych:** https://www.robopsych.com/robopsychpodcast

Other References

1. Bruns, M., Ossevoort, S., & Petersen, M. G. (2021). Expressivity in interaction: A framework for design. In *Proceedings of the SIGCHI conference on human factors in computing systems* (Article No. 163). ACM. https://doi.org/10.1145/3411764.3445231

2. Catania, F., Spitale, M., Cosentino, G., & Garzotto, F. (2020). What is the best action for children to "wake up" and "put to sleep" a conversational agent? A multi-criteria decision analysis approach. In Proceedings of the 2nd Conference on Conversational User Interfaces (Paper No., 4). ACM. https://doi.org/10.1145/3405755.3406129

3. Deckers, E., Wensveen, S., Levy, P., & Ahn, R. (2013). Designing for perceptual crossing: Designing and comparing three behaviors. In *Proceedings of the SIGCHI conference on human factors in computing systems* (pp. 1901-1910). ACM. https://doi.org/10. 1145/2470654.2466251

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5. Leila Takayama. 2012. Perspectives on agency interacting with and through personal robots. In *Human-computer interaction: The agency perspective* (pp. 195-214). Springer. https://doi.org/10.1007/978-3-642-25691-2_8

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10. Reeves, S., Porcheron, M., & Fischer, J. (2018). "This is not what we wanted": Designing for conversation with voice interfaces. *Interactions, 26*(1), 46–51. https://doi.org/10.1145/3296699

11. Teixeira, A., Almeida, N., Ketsmur, M., & Silva, S. (2020). Effective natural interaction with our sensorized smart homes. In A. Neustein (Ed.), *Advances in ubiquitous computing* (pp. 185-222). Academic Press. https://doi.org/10.1016/B978-0-12-816801-1.00006-2

12. Zheng, Q., Tang, Y., Liu, Y., Liu, W., & Huang, Y. (2022). UX research on conversational human-AI interaction: A literature review of the ACM digital library. In *Proceedings of the SIGCHI conference on human factors in computing systems* (Article No. 570). ACM. https://doi.org/10.1145/3491102.3501855

Examination

We design accumulated assignments throughout the course to guide students in applying learned knowledge to complete partial components gradually and complete an integrated result at the elective's end.

The end grade consists of:

- Assignment 1 (week 2): Design scenarios and sample dialogs with primary modality, 10%
- Assignment 2 (week 5): Midterm design, 25%
- Assignment 3 (week 6): Design scenarios and sample dialogs with multiple modalities, 10%
- Assignment 4 (week 9): Final design, 25%
- Assignment 5 (week 10): Team report, 20%
- Individual Reflection (week 10): 10%

In addition, the following conditions apply:

- The final grades vary from 1 to 10.
- In line with university regulations (i.e., OER), the final grade (see the definition above) has to be at least 5.5 to complete this course successfully.
- Each member of a team will, in principle, get the same grade on the group assignments. However, if at least two team members are dissatisfied with another team member's contribution (the so-called free-rider), he/she would only get 10 percent of the group's grade for the assignment. Before they do so, however, team members should appraise the delinquent member of his/her poor contribution and allow the member to "shape up." Approach the lecturer only as a last resort. The reduction in the delinquent member's grade will be proportional to the number of members expressing dissatisfaction and the degree of dissatisfaction with the team member.
- If you wish to cite a team member for a spectacular contribution to the team (the so-called high-flyer), you may do so in the contribution section.
- Please note that if you copy text without referencing the source, you commit plagiarism. Special software will be used to check group assignments for signs of plagiarism. If you are found guilty of plagiarism, all group members will receive a 0.0 for their group assignments. We will also file the cases to the Examination Committee.
- While citing the literature or reference, please check the academic formats and use the rules to produce your Report and document. One of the popular systems is the APA style promoted by the American Psychological Association. You can check the basic guidelines and examples through this tutorial website: https://apastyle.apa.org/style-grammar-guidelines/citations/. The consistency in dealing with scientific information will be one of the criteria for assessing the deliverables. Before submitting your assignment, you should allocate one member to go through the whole document to make a coherent story.

- If you do not hand in a deliverable, you will not receive any grade for that assignment.
- If you submit the deliverable after the deadline without a reasonable excuse approved by Examination Committee, your grade will be deducted with the time delay. The deduction rate will be 5 percent per 10 minutes. For example, if you got a grade of 2.0 while submitting 1 hour after the deadline, the final grade would be adjusted to 1.4 [2*(1-0.05*60)].
- If you do not show up during lectures, group meetings, or presentations without notifying the lecturer or tutor beforehand, this can influence your grade.

Guidelines for Using Artificial Intelligence Software or Applications

As most of you are aware, recently more and more AI tools (such as ChatGPT, MidJourney, etc.) are becoming available to the general public. This of course means that students have access to these tools when creating and preparing reports or other deliverables. We do not want to forbid the use of these tools, as they can be valuable sources of information or inspiration.

We do ask that students take note of these guidelines on how to responsibly use these tools:

- You are not allowed to use an AI tool to create your complete deliverables (images, code, video, text, or any other kind). We want to assess our students on their ability to generate, develop and communicate original ideas effectively.
- If you want to use AI-generated artifacts in your deliverables, you are required to either:
  1. Cite the AI tool as a source (meaning quotation marks, include the date, and the prompt you used and add it to the references). Or,
  2. Create an acknowledgment section that describes how AI tools were used for this deliverable.

The option you choose is dependent on the type of use you make of the AI tools and specifically on the difference between input and output (i.e. using AI to create vs to correct).

- If you do not follow the points above, you are violating academic integrity and at risk of committing fraud or plagiarism.
- Exceptions to this are possible, with explicit (written) approval from your mentor or coach.

Further aspects to consider when using AI tools:

- If you want to use AI tools as a source for inspiration, make sure that you double-check the information, declare the use of AI, and also make use of other (non-AI) sources. The answers given by AI tools are not always correct.
- Do not upload any sensitive data (especially personal data) in these tools, as this might cause a data leak.
- Be aware that there might be IP issues emerging when you upload data/written work/prototypes or other ideas in these tools, as everything will be stored in their cloud and will be publicly available. Be especially careful when working with company data (from an external party).
- Currently, most AI tools use sources up to 2021 and are therefore not able to answer questions about recent events or research.
- Using AI for co-creating is possible, however, it will not be sufficient ground for an in-depth exclusive claim for any of the expertise areas.
- We expect that you discuss your use of AI with your coach, and use critical and common sense when using these tools.

Fraud & Plagiarism statement

Academic Fraud

It is strongly prohibited to commit fraud. With any suspicion of fraudulent behavior, the exam committee will be contacted to decide whether or not fraud occurred. Fraud includes any behavior or negligence on part of the student that makes it impossible for an examiner to form a correct judgment of his or her knowledge, insight, and skills, or that is aimed at intentionally manipulating the examination process.

Types of fraud:

- Plagiarism (e.g., taking credit for material that is not your own, and which ranges from giving poor credit to the original source to the intentional copying from the works of others)
- Scientific fraud (e.g., fabricating data)

Students of the TU/e are expected to conduct themselves in accordance with the values and standards of academic practice, as set out in documents including the TU/e Code of Conduct for Academic Practice and the TU/e Education Fraud Policy. Obviously, this means that students must not, for example, commit any form of fraud, including data falsification/fabrication, plagiarism, and deliberate attempts to influence the result of an examination.

To prevent fraud, all deliverables will be checked using plagiarism-detection software. If fraud is suspected, the case will immediately be handed over to the Board of Examiners (BoE) of the department where the student in question is enrolled, and the student(s) involved will not receive their grade before the BoE has made its judgment.

Consequences

When a suspicion of fraud is raised during or after exams or projects, the student receives no grade (yet), and the case is handed over to the exam committee.

The default punishment for first-time offenders is:

- Student fails on the entire course (even when plagiarism occurred in a small intermediate assignment)
- Student is excluded from taking the exams of that course for one year
- The misconduct will be entered into the student's file
- Student is no longer eligible for a judicial when graduating (met hoge waardering / cum laude)

The maximum punishment (e.g., for a recidivist):

- Student's education at TU/e will be terminated

More information on fraud (including the various forms of plagiarism) can be found at:

https://assets.studiegids.tue.nl/fileadmin/content/centrale_content/STU_files/Toetsen_en_fraude/150409_TUeEducationFraudPolicy_def_version_1_1.pdf