Week 44 (Course week 1)

This first week you should focus on the *Foundation* of your design. Your first task as a group is to decide on the key parameters for your interactive robot:

1. Think about *who* the human(s) involved with the robot will be: the **stakeholders**. These include of course the **end users**, i.e., people directly interacting with the robot, but may also include other humans not directly involved in the interaction. Examples are medical staff using a robot with patients, or people operating/assisting the robot in its tasks, etc. When choosing your target end user population, it is important that you take into account relevant demographic aspects (age, cultural background, expertise, etc.).
2. Think about the **purpose** of the robot. In other words, how will the robot be **useful** to the stakeholders? Do you expect it to have a positive impact on the specific task at hand, on the human(s) themselves, or even on society in general?
3. Think about the **role** of the robot in relation to the human. Is it more of a tool, a peer, a mediator, a teacher, a learner, a proxy, …?
4. Think about the **setting**: Where will the interaction take place? How frequently and for how long?
5. Start thinking about your **interaction design,** *i.e., …* There are many aspects and features of a socially interactive robot that you could design and consider, but the time you will have during the course is limited. It therefore may be a good idea to focus on some aspects more than others. Here are some ideas to get you started:

a. **Gesture** design
b. **Emotion** expression and detection
c. User **interaction**
d. Creative robot **appearances**, use of **context features**, etc.
e. Design a **personality** and/or **backstory** for your robot.
f. …

To help you brainstorm about your project topic, we recommend reading relevant parts of *"An extended framework for characterizing social robots"* (Baraka*, Alves-Oliveira*, Ribeiro, 2019).

You should base your design on *Human-factors knowledge* and motivate your ideas by finding a paper that you can use as the starting point for your design. Incorporate these decisions in the *Problem statement*, *Problem scenario*, *Target audience*, *Personas*, *Human-factors knowledge*, *Design scenario*, and *Application*

context sections in your design document. See for more explanation also the template instructions in these sections.

Week 45 (Course week 2)

The description for this week is short but during this week much of the work that you will build on in later weeks needs to be done. You should start documenting your design ideas in the *Design ideas and principles* section and specify a first version of the *Use case* you want to implement. Also begin specifying a first version of the interaction you have in mind by means of an *Interaction diagram*. Finally, provide a motivation why it is a good idea to use the Nao robot platform as a socially interactive robot to address the specific problem discussed in your *Problem statement*. Do not simply create a use case and interaction diagram but actively check whether you will be able to realise these design artifacts in your robot software during your practical session.

Week 46 (Course week 3)

It is important to make precise what the main effect(s) are that you would like to achieve. You should specify these in the *Requirements and claims* section (e.g., do you expect to see effects of emotional expressions, engagement, etc.). You should formulate a research question and think about how you are going to evaluate this question. Incorporate this in the *Research question,* and *Method* sections in your design document; also see the template instructions for more explanation.

When writing the *Method* section take into account that you will only have a very limited number of participants that will take part in your evaluation study (another group with 6 or 7 members will be your participants). It therefore is very unlikely that you will be able to obtain any interesting quantitative findings and you might want to focus on the more qualitative aspects of your interaction design, problem, and design objective in your evaluation. Also be aware that you need to specify exactly the **procedure** for evaluating your robot so others(!) are able to conduct your experiment.

Also note that you need to think about ethical approval for your study. In our case, we do not need to go through the full process but please briefly reflect on ethical issues your participants might face when taking part in your study and perform an ethical self-check (see the template for more details).

Make sure you update other design document sections to keep them up to date with your latest ideas and the changes that are implied by the design decisions

you have made this week. Remember to continuously update your design document as during the project you will iteratively improve your design.

You should also provide viewing access rights to your design document (in progress) with the UU theatre students, which will help them to create an inspirational moodboard (see next week).

Week 47 (Course week 4)

At the beginning of this week the theatre students will share their ideas on shaping the performance of a socially interactive robot in the form of an **annotated moodboard**. A moodboard is often used by designers to collect materials in a collage to identify relevant inspiration materials for their design projects, for aesthetics, style, and design direction. The moodboard will provide multiple sources of inspiration for you to design your interactive robot. The annotations are short texts to explain why a source might be relevant. In the middle of the week, on Wednesday, you will also be able to interact online with the theatre students to ask questions and discuss their ideas (see the Course schedule). The theatre students will present and discuss the inspiration sources they selected and explain their selections further. Make notes during the session which you can incorporate later in the *Reflection* section of your design document.

Reflect on and consider whether, and, if so, how you can incorporate ideas you get from the moodboard. You are free to use the moodboards in the way you see fit, based on your focus and other design decisions. Whatever you do, you should at least give the moodboard some thought and consideration and document the process on how you reflected on the moodboard from the UU theatre students in the *Reflection* section of your design document. Don't forget to update other (sub)sections in your *Interaction design* section too.

This week you should also have coded your first robot prototype and have created a short demo video that you can share with the theatre students again. Therefore it is a good time to start working on the Implementation section. See the template instructions for more on how to do that.

Week 48 (Course week 5)

At the beginning of this week you will receive a one-page review containing both descriptive and analytical elements from the theatre students who have looked at your demo video from a dramaturgical perspective. You should reflect on how the robot performance is received by the theatre students and think about how

to update your robot design based on the insights you gain from the review. Update the *Reflection* section again and other design document sections that need to be updated. Note that this is the last week you can still make significant changes to your design as in the next week you will need to finalize your implementation and design.

Tip: Don't forget to prepare the *Materials* needed for the evaluation (and add these as appendices to your design document).

Week 49 (Course week 6)

You should focus most of your effort on completing the *Methods* section of your design document. In particular, make sure that you complete the **evaluation procedure** in the *Procedure* section. It should be a detailed step-by-step procedure that is clear enough for the students in another group to execute. Also, prepare all the **materials** needed to execute the procedure (think about instructions on how to execute the code, instructions on where to locate and how to store log files, questionnaires, and any other materials that are needed).

Tip: Ask your TA to review the evaluation procedure and perform the evaluation during your practical session.

At the end of this week, share the **evaluation procedure and all associated materials** with the group who will evaluate your robot.

Week 50 (Course week 7)

While you wait for the evaluation results for your robot, further improve your design document and make sure it accurately reflects your implementation (perhaps you included design features in an earlier version of your document that you were not able to realize). Also, finalize the *Implementation* section documenting your robot software.

Week 51 (Course week 8)

You have *received the evaluation results* from the group who evaluated your robot (a **summary report** and **data**). Add these findings of your robot to the *Results* section of your design document and discuss these in the *Discussion* section. Process all the feedback in your document and finalize your *Reflection* section. Add a *Summary* in which you summarize your design objective and project and a *Conclusion* that presents the main highlights (results) and lessons learnt.

Finally, each group member should write a half-a-page individual project summary and add this to the *Individual Project Summaries of Group Members* appendix. See the template again for more on how to do that.

Submit your **final design document** by adding a **pdf** version of this document in your Google folder.

Final Video Presentation *(Deadline Tuesday 15-12)*

The motto of the final video presentation is: **Show how your socially interactive robot came to life!** You need to create a video presentation of 5-7 minutes to present your project during a final online presentation session with other groups (we plan to have 3 sessions using Zoom with groups in the final week during the exam slot) and with the theatre students from Utrecht University (share a link so they can view the video). In your video you can **demonstrate your socially interactive robot** (use the material you created during the last practical session) but you should also briefly **introduce your group**, **introduce your use case**, **explain the design choices** you made and why, present **highlights from the design and development process** itself (create some photo/video material at various moments during the course), and your **main findings**. Think of this video presentation as selling your own work to the rest of the world. After your video, there should be still time for a short discussion about your results with the audience, so you should also prepare for possible questions.

Your video will be ranked by the other groups present in the Zoom session. The two groups in each session that are ranked highest will get a bonus (on top of their final grade). See Grading criteria below for how to rank a group. The TAs and teacher present in a session will also grade the video presentations.

Grading

Grades for each of the main deliverables will contribute to a final grade for your group work and will be weight as follows:

- Use case presentation (15%): grading is based on:
  - how well all aspects of the use case itself are presented (clarity);
  - how well it is motivated (why this use case);
  - creativity (how will the robot perform).
- Robot software (15%): grading is based on:

- the objective measures of number of code lines and the robot capabilities used (Python API methods);
- a more subjective assessment of how sophisticated the features that you have developed in your code for the robot are; we'll look at and weigh:
  - how **complex** the interaction design is;
  - how **creative** the features that you have developed are;
  - the use of **special features**, e.g., emotion expression, sounds, etc.
- Design document (50%):
  - How convincingly the **problem and its proposed solution** are presented;
  - The **originality** of your socially interactive robot design ideas;
  - How the **illustrations** you have added contribute to understanding your design ideas and process;
  - How useful the **process documentation** of your design and implementation process is for future improvements of your design process;
  - How concrete and specific your **research question, evaluation procedure and materials** are;
  - How useful the **outcomes** of the evaluation of your robot are for improving your design or giving insight in the effects of your robot interaction design.
- Final demo presentation (20%): grading is based on:
  - The originality of your design choices;
  - The quality of your video; how well did you present your project?
  - The findings for your robot (results from evaluation);
  - How well you addressed questions during the discussion.
- *Bonus point* based on ranking within your session (top ranked group 1 point, second-ranked group .5 point)

In case we find clear differences in what and how much individual group members have contributed to the final result (deliverables), we may take this into account and differentiate grades for individual group members. We will use input from the TAs who will discuss with your group each week to establish such differences.

Do's and don'ts when working with a NAO robot

During the course, you will work with a NAO robot. Yet, it is very important to keep several things in mind when working with those robots, as they are fragile and also very expensive (about 7,000 EUR).

Please make yourself familiar with the content of the video series below as well as with the rules *before* working with a NAO robot the first time!

The following video series by Softbank shows how to handle a NAO robot: https://www.youtube.com/playlist?list=PLU2x4uo25hLGANcGjETaPk19c4tqs0X9F . Make sure to watch **videos 1-5, 8 and 9**.

Make sure to follow these important rules (doʼs and donʼts):

- Always place the NAO robot on the floor!
- Do not take the NAO robot outside of the lab *without explicit permission*.
- Watch your step when walking around in the lab.
- Grab the NAO robot under the arms and armpits when taking them out.
- When trying out a new movement (with choregraphe) always make sure that you watch and spot the robot, as the NAO robot could easily lose its balance!
- Never pull the fingers of the NAO robot, as those can break easily!
- Donʼt try to force the NAO robot to change position if itʼs locked.

HRI 2022 Student Design Competition

There is a great opportunity to present your work outside the course in the Human-Robot Interaction Student Design Competition! The HRI 2022 Student Design Competition is a friendly international competition, open to small teams (or even just you!) of high-school and university-level students. The aim of the competition is to present an interactive robot in front of an international audience of researchers, during the HRI 2022 Conference, that will be held in Sapporo, Japan, from the 3rd to the 7th of March 2022.

The **submission deadline is 10 December 2021** and is therefore quite aligned with the course. More information about the competition can be found here.

No labels