

Week 12

Human-Robot Interaction

Report Preparation

**UWE
Bristol**

University
of the
West of
England

Report User Study

- Individual submission
- Up to 3000 words
- Written in the style of a paper
- Example paper:
<https://www.frontiersin.org/articles/10.3389/frobt.2017.00021/>

Report User Study

- IEEE conference proceedings templates:
 - <https://www.ieee.org/conferences/publishing/templates.html>
 - Latex: https://www.ieee.org/content/dam/ieee-org/ieee/web/org/conferences/Conference-LaTeX-template_7-9-18.zip
 - Word: <https://www.ieee.org/content/dam/ieee-org/ieee/web/org/conferences/conference-template-a4.docx>
- Overleaf has the template available
 - <https://www.overleaf.com/>

Report Structure

- Abstract
 - Introduction
 - Related Work
 - Methods
 - Hypotheses
 - User Study Design
 - User Study Procedure
 - Dependent Measures
 - Participants
 - Results
 - Discussion
 - Conclusion
- } This needs to be written by yourself!
- } This part can be written together with the group
- } This needs to be written by yourself!

Abstract

- The abstract should be 200–250 words
- Please follow the following structure for the abstract
 - **Background** → 1-2 sentences about the motivation for the study
 - **Methods** → A short description of the user study
 - **Results** → Summary of the most important results
 - **Conclusions** → Summary of the discussion of the results
- Further reading:
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3136027/>

Abstract Example

Background

We conducted a user study for which we purposefully programmed faulty behavior into a robot's routine. It was our aim to explore if participants rate the faulty robot different from an error-free robot and which reactions people show in interaction with a faulty robot. The study was based on our previous research on robot errors where we detected typical error situations and the resulting social signals of our participants during social human-robot interaction. In contrast to our previous work, where we studied video

Methods

material in which robot errors occurred unintentionally, in the herein reported user study, we purposefully elicited robot errors to further explore the human interaction partners' social signals following a robot error. Our participants interacted with a human-like NAO, and the robot either performed faulty or free from error. First, the robot asked the participants a set of predefined questions and then it asked them to complete a couple of LEGO building tasks. After the interaction, we asked the participants to rate the robot's anthropomorphism, likability, and perceived intelligence. We also interviewed the participants on their opinion about the interaction. Additionally, we video-coded the social signals the participants showed during their interaction with the

Results

robot as well as the answers they provided the robot with. Our results show that participants liked the faulty robot significantly better than the robot that interacted flawlessly. We did not find significant differences in people's ratings of the robot's anthropomorphism and perceived intelligence. The qualitative data confirmed the questionnaire results in showing that although the participants recognized the robot's mistakes, they did not necessarily reject the erroneous robot. The annotations of the video data further showed that gaze shifts (e.g., from an object to the robot or vice versa) and laughter are typical reactions to unexpected

Conclusion

robot behavior. In contrast to existing research, we assess dimensions of user experience that have not been considered so far and we analyze the reactions users express when a robot makes a mistake. Our results show that decoding a human's social signals can help the robot understand that there is an error and subsequently react accordingly.

Introduction

- Background → Explanation of the topic of the report
 - Motivation → Explain why it is important to study the this topic
 - Aims and solution → Aim of study and proposed solution
-
- Further reading:
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4548565/>

Related Work

- Literature review of publications that are related to your user study
- For each cited publication
 - Briefly describe in your own words what has been studied
 - Describe the most important results
 - Explain how this work is related to your study
- Please follow the usual citation rules

Related Work Example

Ragni et al. (2016) performed a study in which a human and a robot competed against each other in a reasoning task and a memory task. During the interaction, the robot either performed with or without errors. While participants rated the faulty robot as less competent, less reliable, less intelligent, and less superior than the error-free robot, participants reported having enjoyed the interaction more when the robot made errors. However, the task performance was significantly lower in the faulty robot condition.

Our approach extends the existing findings in several dimensions. While the errors in the study of Ragni et al. (2016) were based on errors from HHI, the errors we used were modeled based on data from HRI. Our work and that of Ragni et al. (2016) further cover different aspects: (a) their errors were task-related, ours non-task-related; (b) they covered the cognitive ability of the robot and we dealt with socially (in)appropriate robot behavior and more general soft- and hardware problems; and (c) they assessed the overall enjoyment of the interaction and users' task performance, while we looked into the interconnectedness of likability, anthropomorphism, and intelligence.

References

Ragni, M., Rudenko, A., Kuhnert, B., and Arras, K. O. (2016). “Errare humanum est: erroneous robots in human-robot interaction,” in Proceedings of the IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN 2016) (New York, NY: IEEE), 501–506.

Methods

- Main section that describes your user study
- **Hypotheses** → The hypotheses you made when you designed the study
 - Hypotheses need to be testable
 - Example: A robot that commits errors during its interaction with humans is perceived as more likeable than a robot that performs flawlessly.
- **User Study Design** → A description of the set up for you study
- **User Study Procedure** → The procedure you used to lead the participants through the study from greeting to de-briefing after the study
- **Dependent Measures** → The questionnaires and other measures used
- **Participants** → A brief overview of the participants you had (number of participants, gender distribution, average age, pre-experience)

Results

- Report of the results of the taken measures
- The result section should not contain your interpretation!
- Include statistical analysis of numerical results
- For qualitative measures, include overview of comments that were made, e.g. in any post-study interviews
- Example result section:
<https://www.frontiersin.org/articles/10.3389/frobt.2017.00021/full#h4>

Discussion

- Discussion → Your interpretation of the study results!
- **Individual part of the report!**
- Goals for Discussion section:
 - Critically analyse and interpret the findings of your study
 - Place your findings in the context of published literature
 - Describe how your study moves the field forward
 - Describe any limitations of your approach (don't try to hide any issues, making mistakes in the study is fine)
- Further reading:
<https://www.biosciencewriters.com/How-to-Write-a-Strong-Discussion-in-Scientific-Manuscripts.aspx>

Please note: Article places conclusion and future work into discussion, we have them in a separate section

Conclusion

- The conclusion rounds of your report
- **Individual part of the report!**
- In the conclusion, answer the following questions:
 - What is the main take-home message of your study?
 - What is the main contribution that your study makes to your field?
 - For whom are the study results important?
- End the conclusion with a discussion of future directions
 - What follow up studies should be conducted based on your results?

Section	Criteria	Weight
Abstract	Abstract describes background, method, results, and conclusion	5%
Introduction	<ul style="list-style-type: none"> • Aims of study defined • Context of study defined 	5%
Related work	<ul style="list-style-type: none"> • Relevant work addressed • Relation of own work to previous work discussed 	10%
Methods	<ul style="list-style-type: none"> • Hypotheses defined • Study design and procedure described in a clear, understandable way • Dependent measures described • Participant overview given 	20%
Results	<ul style="list-style-type: none"> • Results are described without given own opinion • Statistical analysis of numerical results • Overview of qualitative results (e.g. from interviews) given 	10%
Discussion	<ul style="list-style-type: none"> • Results are critically analysed and interpreted • Results are placed in context of previous literature • Description of contribution of own work present • Limitations of study are discussed 	20%
Conclusion	<ul style="list-style-type: none"> • Main results summarised • Follow-up work is discussed 	10%
Ambition	<ul style="list-style-type: none"> • Complexity of study protocol • Number of participants • Richness of data analysis 	15%
Overall	<ul style="list-style-type: none"> • Correct spelling and grammar • References are cited correctly 	5%

Assignment on Blackboard

- **Individual report** submission on UWE Blackboard
- Use the IEEE conference proceedings templates
- Please submit a single PDF containing all the text and pictures
- In the author section put
 - Your name in the first line
 - Group number and names of other group members in second line
- PDF file name: hri-2019-report- <your-name>.pdf
- **Deadline: Tuesday 30.04.2019, 14:00**
- **We follow UWE guidelines for late submissions**
<https://www1.uwe.ac.uk/students/academicadvice/assessments/faqs.aspx>