Human Robot Interaction
in an Airport

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Abstract— **Social robots are expected to play a much bigger role in the near future. This calls for research in determining how these social robots are supposed to behave. This paper presents an ecological field study and investigates the subjective experience of social robots in Aalborg Airport (AAL). Travellers were recruited by a remote controlled robot from Double Robotics, Inc., which had a tablet with an interface asking if it may help them with wayfinding in AAL. When the participants had chosen their location they were asked to follow the robot and led to a semi-structured interview about their first impressions. In total the study includes 27 participants from 8 to 62 years (M=37.9, SD=17.1). The observations and the participants' statements were coded using an Affinity Diagram. 567 affinity notes were sorted and ended up with 10 categories of which the main categories revolved around appearance, behaviour, approach and trust.**

I. INTRODUCTION

The field of technology and robotics are moving faster for every day. So is the prospect of having to engage with social robots in every day life. This raises technological, normative and empirical questions as to how these robots are to behave and in which settings they might be useful. These questions will likely have to be answered with interdisciplinary methods by joining cognitive psychology, phenomenology, and anthropology with social robotics and engineering. Social robotics needs Humanities in order to gain insights in human interaction and behaviour and as a means to guide the technological design of the robots themselves. In writing, a social robot for an Airport setting is being developed at Aalborg University and there seems to be missing a framework as to how such a robot should behave in a crowded area or simply how to approach travellers. Some research have tried to make a protocol for the acceptance of social robots by defining several important variables for the acceptance[**Exploring influencing variables.., 2013**], [**Sharing a life with Harvey, 2015**]. Both studies investigated the acceptance of social robots in the privacy of their own home. It is hard to know how big an influence culture or the setting has on these resulting variables though previous studies show that it can play a big role [**Mangler kilde her**]. Few have already conducted research on social robots in an airport setting [**PhD. Thesis, Michiel Joosse, 2017**] but it is not known whether or not these results are applicable to Danish travellers. It is important to define and document which parameters are important for Human Robot Interaction (HRI) in the Airport. This is something that is hard to do in a controlled laboratory setting and is why this paper presents an ecological ethnographic study conducted with a remote controlled robot from Double Robotics, Inc. in Aalborg Airport (AAL). The robot appeared to help with wayfinding in AAL and the purpose was to develop usable scales based on observations and the participants' own statements about their first impressions.

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II. METHOD

Real travellers were observed interacting with a robot in AAL and interviewed in order to get a sense of peoples' experience and the words they use to describe interacting with a robot in an airport. In total 30 travellers, including 16 women and 14 men, was interviewed during 18 interviews. 11 interviews were performed including a single traveller, where the remaining seven was done on groups of two or more. The participants' ages range from 8 to 62 years (M=37.9, SD=17.1) and have all been travelling more than once.

During the tests a Double robot was used from Double Robotics Inc. Double is basically a segway merged with an iPad and in this study a new head mount was used, so that the iPad was tilted upwards towards the participants, see figure (indst billede af double og referencen hertil). Travellers were shown a wireframe on the iPad, intended to help them find a location in the airport of their choosing. In order to create a natural experience, the robot was used to recruit participants by asking them if it could help them find their way around AAL. When travellers were willing to participate the robot led them to the interviewer instead of the chosen gate or restaurant. By doing this, the interviewer could start the interview by asking participants how their first meeting with the robot was without having to first set the scene for the participants and interfering with the natural first impression.

The user experience is then documented like a contextual field study with observations and a semi-structured interview. The interviews are then transcribed and affinity notes are made for building an affinity diagram. By building an affinity diagram these notes can be sorted into a hierarchy of different categories and subcategories, which will tell the user's perspective of the interaction. The affinity diagram represent some of the main areas that are important for travellers when interacting with the robot. These areas are used to create scales, which then are tested with new users in the airport.

After gathering data on the chosen parameters, it can then be evaluated in which degree the different attributes contribute to the overall experience of the interaction and how they relate to each other.

III. RESULTS

The 567 affinity notes were sorted into 149 blue categories, which were then sorted into 47 pink categories, which were finally sorted into 10 green categories. Some of the main categories consisted of the robots appearance, behaviour, approach and trust.

Compare results to literature

IV. DISCUSSION

We introduce some interviewer bias, by having predetermined questions that drag the conversation in a certain direction. That means people talked a lot about a specific aspect of the interaction, because they were asked directly about it.

Due to the Marvel wireframe running inside the double app, the touchscreen was less responsive than expected. This resulted in some people not wanting to interact with the robot, but also it affected the experience for those who chose to interact with it anyway.

V. CONCLUSION

The conclusion goes here

A. Future work

During the next month, the evaluation of the scales in the airport will take place. This involves creating the scales from the results of the affinity diagram, bringing the robot to the airport, letting people interact with it, and measuring their experience on the developed scales and analyzing the results

ACKNOWLEDGMENT

REFERENCES

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