Social and Service Robots in Hospitality

A study with two humanoid robots

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Degree Thesis

DEGREE THESIS	
Arcada UAS	
Degree Programme:	International Business
Identification number:	8327
Author:	Rafael Faria
Title:	Social and Service Robots in Hospitality Understanding how Amy and Alf perform
Supervisor:	Christa Tigerstedt

Abstract:

With the hospitality industry in mind, this thesis looks at robots' acceptance and functionality. This thesis is aimed to find information about service and social robots and investigate how two humanoids Amy and Alf, can be accepted and applied in the hospitality sector. This thesis also addresses the service and social robot user experience, feelings, and insights. The small-scale study was performed using data collected on workshops at the Arcada UAS Campus during November and December 2020, with students in the hospitality and service design courses. The primary data was collected through a survey questionnaire, field observations, video and audio recordings. Thematic analysis was performed to identify themes and support answering the research questions. The data gave way to answering how are social and service robots seen as possible purposeful agents in the service sector. Moreover, to find what features are seen as useful in a service context.

The two humanoids in the study were seemingly well received by the users, with particular consideration to the design differences and features availability making Amy a straightforward service robot. In contrast, Alf a more sociable humanoid, with users who have a more playful attitude during its workshop tasks. With ongoing development and societal changes, there are many opportunities to continue studying the use cases for service and social robots in hospitality and other industries.

Keywords:	Hospitality, social robot, humanoid, AI-driven agents, HRI.
Number of pages:	45
Language:	English
Date of acceptance:	

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1 INTRODUCTION

This thesis offers a look into the applicability of social and service robots in the hospitality industry. It is understanding human-robot interactions, best practices, and the development of these technologies in the hospitality industry.

1.1 Background

Hospitality companies are rightfully expected to provide welcoming warmth and interaction readily associated with the human touch. A smile and the assurance of support by a front desk attendant, the attention a restaurant waiter gives patrons. An airport agent chats with passengers while verifying their documentation and processing the check-in to a flight. These are all activities that until recently could only be imagined being performed by a human. Social and service robots have been evolving and present new capabilities to take on tasks in the service or social realm, slowly starting to be implemented by hotels, restaurants, and other businesses(Go, Kang, and Suh 2019).

In recent years, social media consumption has increased exponentially and plays a more significant role in many lives. With a larger portion of time being spent online, the accumulation of the usage data and patterns has created the virtual global conscience and strengthened the case for artificial intelligence field application(Campa 2016). With the increased social media presence, consumers are more likely to allow personal data to be used for marketing purposes, contact centres using chatbots to interact with their customers, and the availability of new robotic service automation tools taking on repetitive tasks. In some cases, social and service robots can perform more consistently and more efficiently than their human counterparts(Lu et al. 2020).

With a reasonable expectation that in the following decades, some positions or tasks will be filled by robots and artificial intelligence systems interacting with customers (Buhalis

2019), we are experiencing the era of Robots, Artificial Intelligence, and Service Automation (RAISA) technologies to design and deliver services to their human guests (Ivanov & Webster, 2019, p. 7).

This thesis is done as a part of the AFORA project at Arcada UAS. The AFORA project investigates the development and applicability of two social robots Amy and Alf, in the service sector. These humanoids are being programmed to do different tasks and put into service to deliver meaningful interactions with different kinds of end-users.

1.2 Research Aim and Research Questions

The aim of this thesis is to find more information about service and social robots in the hospitality industry, in this case, to investigate how Amy (CSJBOT 2021) and Alf (Sanbot 2021) are accepted and possibly applied in the hospitality industry. This thesis also addresses the service and social robot user experience aspect, aiming for high levels of personalised service and user experience.

This thesis sets out to understand how service and social robots, Amy and Alf, are accepted and can be used within the hospitality industry. To find out what robots' functions are seen as useful in a service context. Service design students provided their thoughts about the service sector per se, as they were part of the survey and workshop, where this thesis' primary data was collected. So to answer the research questions below:

> How are social and service robots seen as possible purposeful agents in the service sector?
>
> What features could be are seen as useful in a service context?

1.3 Limitations

This thesis focuses on the applicability and acceptance of humanoid robots like Amy and Alf in the hospitality industry and finding viable features to be seen as useful in the service context. The small-scale study was performed using data collected on workshops at the Arcada UAS Campus during November and December 2020, with students in the hospitality and service design course, as respondents to a survey questionnaire.

This thesis does not attempt to resolve the applicability nor acceptance of robots in fields other than the hospitality industry. The results of this study are also limited to understanding how the selected robot platforms, Amy, and Alf, can be deployed. Robot types other than these humanoids are excluded from the data research and findings of this thesis.

This thesis does not focus on the economic aspects of deploying a special or service robot. Its focus is more directed towards service development and customer acceptance and experience.

1.4 Expected Results

The author sets out to investigate and better understand the acceptance application of humanoid robots within the hospitality industry. The goal is to gain insights from participants of AFORA workshops and provide suggestions for the industry on how to take advantage of the available technologies and enhance the customer experience with technological touch and the human touch.

This thesis may benefit hospitality industry companies looking for complementary approaches to employ robots like Amy and Alf in the service field. This thesis may also contribute to increasing the understanding of HRI in general.

1.5 Structure of Thesis

This thesis is divided into five chapters. The first chapter introduces the background of the thesis, the research problem, aim, research question, limitations, and expected results.

In the second chapter, the author presents the literature framework. The literature works as a starting point for this research. The subject matters in the second chapter are existing studies regarding interactive Technology Acceptance Model (iTAM), Robots, Artificial intelligence, Service Automation (RAISA), and Human-robot Interaction (HRI) research models.

In the third chapter, the author elaborated on the chosen method, qualitative and ethnography based, which allows for observations on how our workshop participants interacted with the two robots; this established the empirical part of the data collection. There were quantitative questions included on the questionnaire to establish the state of experience of our respondents with robots like Amy and Alf. This chapter also elaborates on how data collection was devised and performed. The third chapter also provides information about the participants of the workshops that happened at the Arcada UAS campus. Chapter three also includes a description of Amy and Alf, the two robots used in this study.

The fourth chapter is an analysis of the data from the workshops and the empirical results, which gave way to the invaluable insight provided by our participants on how Amy and Alf are perceived and could be employed in the hospitality field. The fourth chapter also includes a review of the findings from both the theoretical and the empirical parts. It provides inferences based on the findings; they also contain trustworthiness and suggestions for additional research.

The fifth chapter includes a discussion and conclusion, completing the thesis paper with a summary of the previous chapters and the results of the research.

2 THEORETICAL FRAMEWORK

This chapter will cover the literature framework for this thesis. The main subjects discussed in this chapter are the acceptability of robots by end-users, related to previous research models, possible applicability of the robots, and a review of the previous work findings.

There are various types of robots, from the very functional factory automation robots that build cars and other goods with high levels of precision and productivity. Now, domestic vacuum robots, or lawn grooming machines, are becoming more and more commonplace, especially in developed countries. There are also robots being employed in the medical field to improve the accuracy of operations and other procedures that need to be performed by fallible human doctors. Robots that can perform delicate surgeries in a few seconds and deliver supreme outcomes and values to the employer of such technology. (Go et al. 2019)

A social robot can be defined as a robot that interacts with humans and even seems to interpret human emotional states. In other words, a social robot must have social skills and is to be seen as a friend with frequent interactions over a specific timeframe. Furthermore, we here see social robots as AI-powered robots. A delivery bot can be defined as a robot that changes an object or product's location from one place to another when operated by customers or operators (Go et al. 2019).

A delivery bot can be defined as an AI robot that changes an object or product's location from one place to another when operated by customers or operators (Go et al. 2019). The robot is intended to be used in a restaurant setting, and therefore the training process and the robot's interface is easy to use. On the other hand, Alf is a social bot that intended to interact with the user through its sensors, cameras, and voice commands. With a broader

range of pre-programmed applications provided by the manufacturer, Alf can cover a range of use cases, e.g., home security bot, reception bot, entertainment, communications bot, and others. No matter the use case, the bots require some setup or training before being put to work. (Sanbot 2021) .

2.1 Hospitality and Technological Tools

In reviewing the conceptual framework for Robot, Artificial Intelligence, Service Automation (Ivanov and Webster 2019), the author establishes the advances and current applicability of the technology in the hospitality industry.

Tourism and hospitality are usually referred to as a "*people business*" – services provided by human service providers (receptionists, housekeepers, waiters, cooks, bartenders, guides, drivers, sales agents, event organisers, supervisors, managers, and others.) for human customers (travellers, passengers, tourists, guests, and event attendees). The labour-intensive nature of the business has been necessary because of the complicated nature of many of the tasks required (e.g., changing the sheets on a bed) and nuances in communications between customers and service providers generally required a human to make judgments, interpret information, and respond to tasks that are not part of standard operational procedures. Considering the technological advances from recent decades such as the Internet, websites, social media, mobile applications, virtual/augmented/mixed reality, chatbots, robotics, and self-service kiosk, we can denote a technological level between companies in Travel, Tourism, and Hospitality (TTH) and their customers. This technological layer reorganised the "*human–human*" interactions in TTH into "*human–machine*," "*human–computer*," and, more recently, into "*human-robot*" interactions. (Ivanov and Webster 2019:7)

While service companies have used self-service kiosks for decades, robots are being introduced into the service business at an early stage. Within TTH industries, robots have various degrees of autonomy, intelligence, and interactivity. They range from basic robots

for cutting grass, cleaning floors, and swimming pools that practically do not interact with humans to more sophisticated room service delivery robots, robotic waiters, and humanoid robots such as Pepper that can actively communicate with humans. For the moment, service robots seem quite clumsy in their interactions with humans and navigation through the premises of hotels, restaurants, and airports. However, the technological advances in AI and robotics will make robots more capable of serving humans and implementing various tasks beyond the 3D (dirty, dull, and dangerous) tasks, which human beings do not want to do, and this will help to overcome the temporary hiccups in robot-delivered services we currently observe and will widen robots' application and adoption by tourist companies (Ivanov, 2019). (Ivanov and Webster 2019:19)

RAISA technologies will not be any time soon wholly independent of human supervision and may be perceived as a threat by human employees. While current robotic technologies are challenged by simple tasks most humans can easily do (such as turning a handle and opening a door), in the long term, the technological advances in RAISA may decrease or eliminate some of the disadvantages of RAISA technologies compared to human employees in TTH. In short, technological advances are expected to make RAISA more attractive for TTH companies. (Ivanov and Webster 2019:24)

From a human resource management perspective, the use of RAISA leads to changes in the *skills* required to work in TTH due to deskilling (a less skilful employee can perform the work) and up-skilling of jobs (more competencies required for human employees). Both deskilling and up-skilling of TTH jobs due to RAISA adoption have their trade-offs. On the one hand, deskilling jobs allows TTH companies to use less-skilled employees to provide essential services. Doing so expands the pool of potential employees TTH companies can hire, thus increasing the competition among employees, depressing their salaries, keeping costs under control, and allowing customers to enjoy low prices if the savings are passed on to customers. (Ivanov and Webster 2019:24)

2.2 Humanoid Service Development and Acceptance

In this thesis, the author focuses on humanoid service robots in the hospitality industry. Attempting to understand how those robots can be best employed in the service and improving the customer experience. Humanoid robots are professional service robots built to mimic human motion and interaction.

At the core of the two research questions in this thesis is a theme of humans and robots interacting and coexisting to identify possible solutions to the service sector. Therefore, the author is also reviewing literature existing on HRI in the hospitality industry (Tung and Au 2018). Within the robotics literature, there is a growing area of research interest in HRI, which emphasise human-centred experiences in which people are the core focus (Tung and Law 2017).

To help shape the review of the primary data in this thesis, the author uses a study that explores consumer reviews with robotics based on the five dimensions for evaluating user experiences (i.e., embodiment, emotion, human-oriented perception, feeling of security, and co-experience), as derived from research in Human-robot interaction(Tung and Law 2017).

The concept of present and embodiment of a robot is also discussed by Tung and Law (2017), confirming that a robot may be in present and body form. The term copresence suggests that a user and a robot are in physical proximity. This distance enables an individual to experience physical and reciprocal perceptions. The experience could range from touching and to being touched by a co-present robot in a human-robot shared environment. (Tung and Law 2017)

Embodiment is affected by a robot's morphology (e.g., anthropomorphic, zoomorphic, caricatured and functional), which represents a robot's form and structure, such as the

shape of its body and limbs and the type and placement of sensors (Pfeifer et al., 2007). (see Tung and Law, 2017, p. 5)

Some of the aspects of Human-robot Interaction in the hospitality industry are still open to be studied in more depth. There are many exciting areas for future research. For example, future research could adopt a longitudinal perspective and analyse temporal changes in user experiences. User experiences from HRI could potentially show the trend over time as the effects of novelty fade away. (Tung and Au 2018)

Using as a resource, the article titled ‘Machine learning of robots in tourism and hospitality: interactive technology acceptance model (iTAM) – cutting edge’ (Go et al. 2019), to further investigate the acceptance of perceptions of customers when dealing with technologies in the tourism and hospitality industry.

Davis (1985) developed the Technology Acceptance Model (TAM), which (Go et al., 2019) indicated that technological key features (X1, X2, and X3) play a significant role in the perceived usefulness (PU) and perceived ease of use (PEU), leading to how well, said technology, is accepted and what attitude end-users would have. Cognitive response factors (PU and PEU) are presented as prominent determinants of affective response (attitude toward using), which leads to behavioural response (actual system use). (Go et al. 2019)

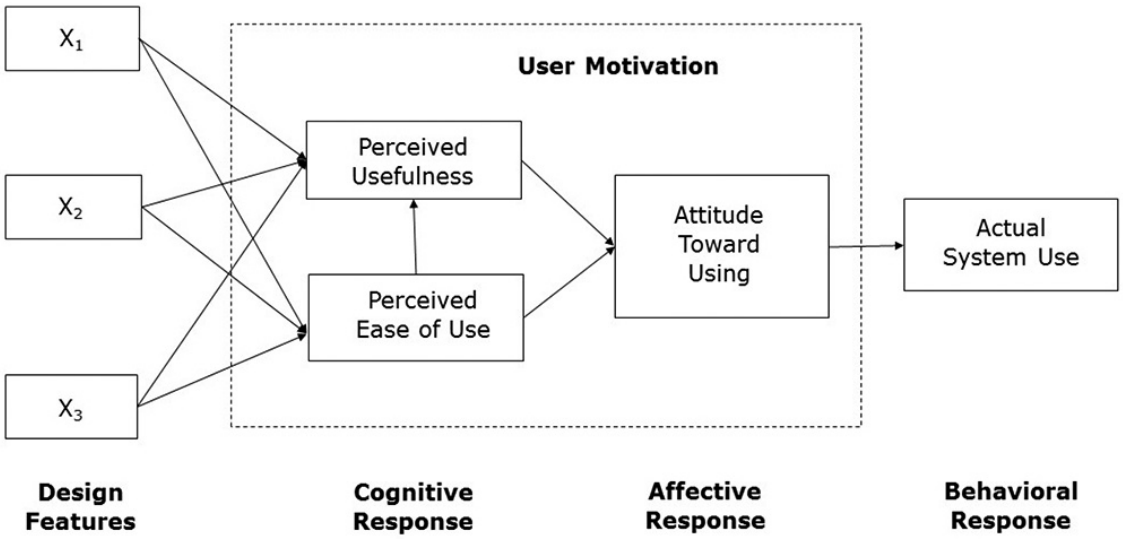

Figure 1. TAM model as presented by Davis (1985) (in Go et al., 2019 p. 6)

The modified TAM (Davis, 1989) concluded that a person's behaviour could be determined by the person's behavioural intention to execute the behaviour, based on the theory reasoned action. However, later TAM studies indicated that the direct relationship between PEU and external determinants is insignificant. Instead, PEU plays a mediating role between PU and intention to use. This study recognises that as later TAM studies test newer and more interactive technologies in an experimental setting, ease of use perceived by users is insufficient for examining how users evaluate the new technology interface or system. (see Davis in Go et al., 2019)

Perceived usefulness is relative to the individual's experience, knowledge, and available information about the technology. There are many aspects to how humans are exposed to and understand humanoid robots.

When studying the AFORA workshop participants, the author focuses on their feedback about how useful Amy and Alf are. Participants can use the robots and, at the end of the event, provide their input on how their experience changed their perception or understanding of the service social humanoids.

A conceptual framework, the interactive technology acceptance model (iTAM), was designed to help future researchers understand how to examine the acceptance of advanced robots, as shown in Figure 2.

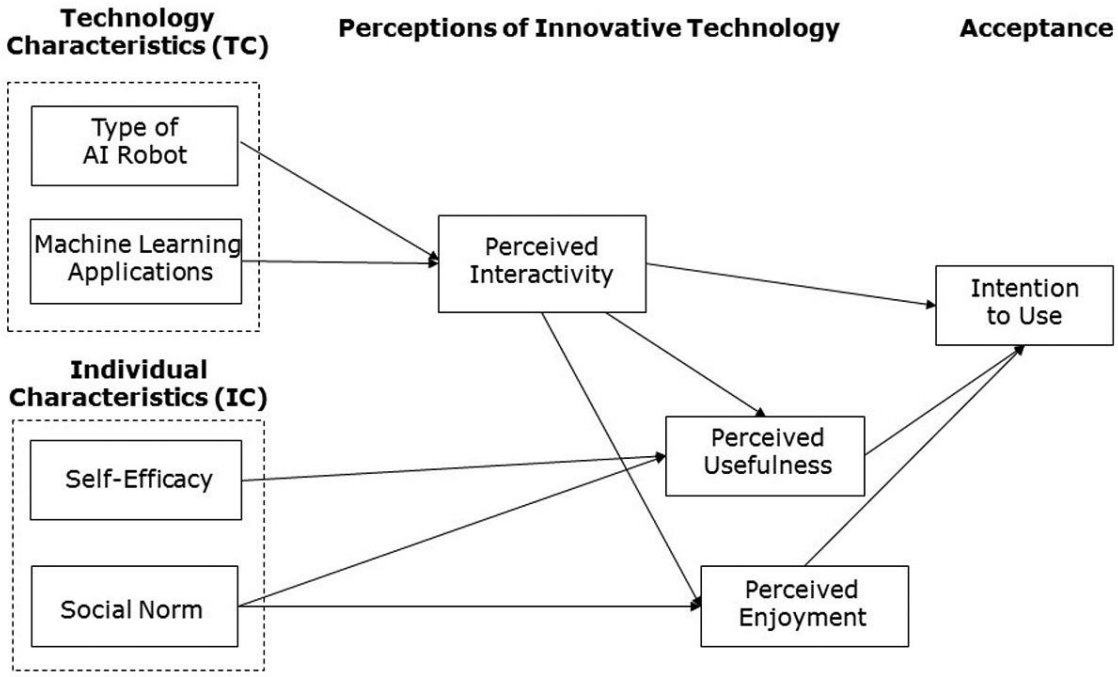

Figure 2. Interactive technology acceptance model (iTAM) (Go et al., 2019 p. 6)

Go et al (2019) proposed framework consists of four main aspects: technology characteristics, individual characteristics, perceptions of innovative technology, and acceptance. These characteristics play a role in how consumers perceive technology. Go et al., (2019) study points out self-efficacy (SE) and SN as essential components of individual characteristics to identify determinants of consumers' characteristics that influence advanced robot acceptance, as mediated by three perceptions. (Go et al. 2019)

3 METHODOLOGY

Research methods provide a structure and allow authors to investigate and collect data and to search for answers to essential questions. Research methods also allow for added trust in the results, considering familiar strategies and parameters being used. This research thesis uses an ethnographic method of observation and tools like field notes and insights to study the interaction between workshop participants and robots on two different occasions. The method and workshops are detailed and explained further in this chapter.

3.1 Method

The method used in this study is based on ethnography, a typical qualitative method of research, to produce primary data used in its findings. According to Bryman and Bell (2011), in this thesis, it means that the author uses the data collected by observing the workshop activities and survey questionnaire answers to perform induction, based on the observations and are being used to generate the results listed in chapter five.

“Ethnography could be viewed as a simple process of joining a group by watching what goes on, making some notes, and writing it all up. Ethnography is nowhere nearly as straightforward as this implies.” (Bryman and Bell 2011:424)

Considering the many facets of ethnography application, the author chose the one that best suited the occasion, observing workshop participants as they interacted with Amy and Alf. The workshop setting presented the opportunity for the participants to show the researcher access to primary data extraction and in-person experience of the nuances and factors that may have impacted the participants’ reactions in accepting and effective use of the humanoids in simulated applications.

When considering the research questions: how are social and service robots seen as possible purposeful agents in the service sector? What features are seen as useful in a service context? The author concedes that answers to those questions are more descriptive and conceptual than measured and numeric. This is why the author took on the qualitative type of research.

3.2 Data Collection

The qualitative ethnographic research of this study was structured on the following steps. Note-taking and observations made by the ethnographer during the events in real-time and after, by listening and watching the voice and video recordings of the participants' interactions with the robots captured during the event.

3.2.1 Participants

The workshop participants were invited to join the activity by the AFORA project lead and at the same time lecturer, who was invited by a teacher colleague. This happened through itslearning, "a cloud-based learning platform"(itslearning 2021), and during a Zoom session, when the project and workshop were explained to the participants.

The participants were students of tourism and service design courses that were happening during the period of the workshop. As well as students, the workshop events participants were working as customer service representative, public relations manager, sales associate, logistic agent, and one in the financial services industry. While the number of participants was not statistically significant, the diversity of their experience allowed for valuable insights into the research questions.

3.2.2 Observation as Data Collection

Observation data gathered on the workshop events happened in different ways: by audio and video recording, survey questionnaire, as well as notes taken during the events by the author. An " *approach to data collection in which the researcher is immersed in a social setting for some time in order to observe and listen with a view to gaining an appreciation of the culture of a social group*."(Bryman and Bell 2011:389) This thesis aims to gain from the participants' views on the two humanoids during our workshop from observations and by survey questionnaires answered after the human-robot interactions with more insights from their experiences.

It is difficult to date the point at which this change of terminology (though it is more than just this) occurred, but sometime in the 1970s, ethnography began to become the preferred term. Prior to that, ethnography was primarily associated with social anthropological research, whereby the investigator visits a (usually) foreign land, gains access to a group (for example, a tribe or village), spends a considerable amount of time (often many years) with that group with the aim of uncovering its culture, watches and listens to what people say and do, engages people in conversations to probe specific issues of interest, takes copious field notes and returns home to write up the fruits of his or her labours. (Bryman and Bell 2011:424)

During two workshop events, the author was a "*participant-as-observer. This role is the same as the complete participant one, but members of the social setting are aware of the researcher's status as a researcher*." (Bryman and Bell 2011). Acting as a note-taker and observer to collect data, and at a portion of the workshop, the author introduced the Q-link app used to control Alf, the social robot.

3.2.3 Qualitative Questionnaire Data

This thesis also used survey questionnaires to collect data, "*researchers employing ethnography or participant observation frequently conduct qualitative interviews* (Bryman and Bell 2011:389)." So, at the end of each workshop event, a survey questionnaire was distributed to participants, collecting their input and insight to understand their level of experience interacting with robots and controlling them, performing different tasks. They were completing the survey questionnaire to collect the data suitable to the research questions. Each participant answered one questionnaire form and handed it to the ethnographer.

The survey form was a combination of quantitative and qualitative questions that aimed to observe the participants opinions and suggestions for applicability for Amy and Alf. The questionnaire was designed into four different sections (see Appendix 1). The first one included a heading, where respondents were informed that all data is treated confidentially, and research ethics are strictly followed, offering tenk.fi for more details on the guidelines. Followed by questions aimed at understanding the respondents' profession, age group, and whether they had experience with operating robots previously.

The second section of the questionnaire was about Amy, allowing for response options ranged from 5 = strongly agree, to 1 = strongly disagree, on a five-point Likert scale (Bryman and Bell 2011:240), to gauge how participants viewed the possibility of employing it at various settings, i.e., restaurant, hotel reception, airport, train station, business office reception and an open answer question, to capture any other ideas they may provide. At the end of this section, the questionnaire asked how easy the interaction with Amy was, and another open question regarding their opinion on Amy's features was.

The third section of the survey was about Alf and how easy the interaction and training with Alf was, and another open question regarding their opinion on Alf's features was.

The fourth section of the questionnaire was designed to capture the answers regarding both humanoids and their features. We asked how human features were important, in the participants' opinion. We asked if facial expressions for robots in the service realm. We also asked how important speech recognition would be in the service context, whether participants believed that social and service robots would be useful/used in hospitality services in the future. At the end of this section, we asked participants' opinion on how social and service robots will be useful or used in hospitality services in the future.

3.2.4 Audio and Video Data Recording

Using a voice recording device to collect verbal communication from the workshop event participants and a video camera to capture the body language, facial expressions to induce observations on these robot whispering events. Voice and video data were reviewed after the events to induce answers for the research questions as well as produce the thematic analysis.

Transcription of the Audio recordings was performed by the author using software powered by Otter.ai (Otter.ai 2021). With a limit of forty minutes per transcription of this event, the audio recording was separated into three different files and transcribed by the software. Because of the inaudible record in parts of the audio recording, there was a need for the author to revise and correct some of the automated transcriptions. Illustrated in figure 3, this was a valuable opportunity to listen multiple times for the data available from the interactions between our participants and humanoids at the workshops. Once the transcribed data was available, the author uses NVivo (NVivo 2021) to organise it into codes first and then into themes, starting the Thematic Analytical process.

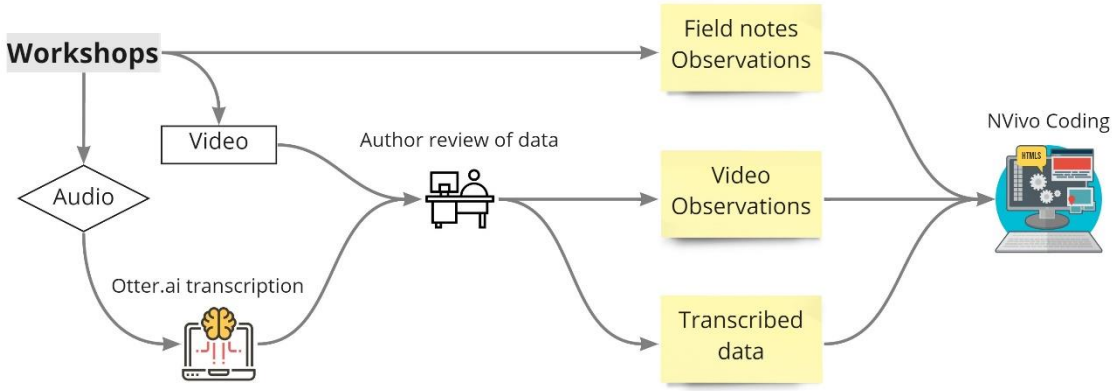

Figure 3. Data Processing Diagram

The video data was made by recordings on two different cameras and presented as multiple individual clips numerically nominated. These clips were also viewed by the author in an effort to revisit the events and make additional observations on how the participants reacted to different tasks and occurrences on the workshop events. These observations were placed on individual Word Documents associated with the video clip numeric nomenclature. While there was no sound on the video clips, the images, showing angles that were not previously obvious to the author, served for more observations to be noted and ultimately used on the findings in this thesis.

As a notable mention, some of the audio recordings did not present clear data and may be omitted from the transcription. Also, not all the scenes were captured by the camera present; therefore, the video clip content does not constitute the total picture of the event activities.

3.3 Data Processing

When producing the transcription documents, the author classified participants with the letter ‘R’ and a ‘number’ based on the appearance of their voices in the recordings. This was an effort to maintain anonymity. For example, the first participant’s voice recording is designated R1, the second R2, and subsequently, the others whose voices were captured

as participants in the conversations received sequential numberings. Some participants did not speak during the events, or their voices were not captured by the recording device in a clear manner. In these cases, they were not assigned a numbering identifier. It is essential to mention that all participants answered our questionnaire at the end of each workshop.

The audio recording from the AFORA workshop provides an opportunity to perform transcription and use the data to complete a thematic analysis. Thematic analysis is one of the most used forms of qualitative data analysis (Bryman and Bell 2011). In it, the author is reviewing the transcription text to identify significant, frequent, and non-frequent themes or patterns that may be important to the research questions and other aspects of the study that may not have been previously considered.

The survey questionnaire data was exported to MS Excel format, and answers numbered to facilitate reference, as needed.

The audio recording from workshops is initially used as the base for the transcription of spoken words. This is done by the use of software that helps with a part of the capturing, presenting an opportunity for the researcher to listen and make adjustments to the automatically captured text. While this is a time-consuming process, it is also a valuable opportunity to listen to the topic of conversations and increase the familiarity of the author with the information gathered, which is the basis for the analysis made towards the end of this thesis.

The workshop event transcription data is reviewed, organised, and coded for efficient data management. By coding the data, the researcher has the chance to organise the themes and access them as needed during the analysis. The list of themes will form the nodes that in turn compose the framework for the findings, as different nodes can be used toward the analysis of the data.

3.3.1 Method of Analysis

This thesis method is based on ethnographic research, by observing the participants during the workshop and processing the data, the author further familiarised himself with the data. The theoretic frameworks studied by the author drove the focus, together with the research questions, as the author compiled the empirical data, organised, and produced thematic analysis in this thesis.

The themes observed on the primary dataset are listed below (see Table 1). The table includes the number of references found on the data files. As part of the research, a qualitative survey questionnaire was developed by the AFORA team, with the participation of the author of this thesis. The participants' answers were analysed and used on the induction of results based on the thematic analysis performed on the dataset.

Table 1. Themes found on the dataset, showing the number of files and references

Theme	Description	Files	References
Function Efficacy	Does the function work? This theme is relating to comments and observations relating to the thesis's RQ: What features are seen as useful in a service context?	9	17
Feature Usefulness	Is it productive? This theme is relating to comments and observations relating to the thesis's RQ: What features are seen as useful in a service context?	10	15
Humanoid Acceptance	Is it accepted and embraced? This theme is relating to comments and observations about RQ. How are social and service robots seen as possible purposeful agents in the service sector?	12	18
Humanoid Perception	What are the participants' 'views' opinions? This is related to the RQ. How are social and service robots seen as possible purposeful agents in the service sector?	6	11
Laughter	This is an emerging theme, more observed explicitly in Alf's portion of the workshop. Counting the occurrences.	3	15
Perceived Ease of Use	This theme is listing observations that relate to the iTAM framework.	9	12
Perceived Usefulness	This theme is listing observations that relate to the iTAM framework.	5	34

3.4 Trustworthiness

Before the workshop events, all participants signed a release form (see Appendix 2), understanding and authorising the use of their answers, video, and audio recordings. This thesis asserts that data used in the analysis were collected during the AFORA workshops and constitute primary data resource. All participants were informed of this activity and agreed to be part of the events, considering their interactions, reactions, expressions of emotions, insights and other information is used by the AFORA team and in this thesis. With the primary intent to answer the research questions posed in this thesis.

While the thirteen participants amount to a small sample, the objective selection of Tourism and Service Design students is purposeful to the aim of this thesis. "In qualitative research, purposive sampling considerations often apply to the sampling of the cases in which the research will be conducted and then to people within those cases"(Bryman and Bell 2011:441). The research team was part of the workshop events, together with the audio and video recording technician, and facilitated the workshop tasks as well as allowed the opportunity to collect data.

The Covid-19 pandemic safety guidelines required all participants to wear face masks to prevent spreading the covid virus. In turn, masks also prevented a clear, direct view of the participants' facial expressions, which was mitigated by the verbal and body language.

3.5 Workshops

3.5.1 Workshop Setting

The workshops were conducted on the Arcada University of Applied Sciences campus in Helsinki, Finland. A total of three workshops, one happened on October 20, 2020, and

two happened on November 11, 2020. Each workshop lasted about ninety minutes. In addition to data collection, these two workshops aimed to introduce the participants to the basics of robot whispering by interacting with different features and functions of both Amy and Alf. The set-up was prepared to perform as a use case, where the students (participants) would be using the controls and features as if they were employed and working with a humanoid on a restaurant or another customer service business.

In addition to the Service Design and Tourism students, the research and project team was comprised of a Department of Business Management and Analytics professor and researcher at Arcada UAS, who was the team leader and facilitated most of the tasks with Alf; a Department of Information Technology Lecturer and researcher at Arcada UAS, who presented and facilitated the tasks with Amy; a Degree Program Director, who assisted the team with the resources as needed; a Business Administration and International Business at Arcada UAS, the author of this thesis; and an audio and video technician, who recorded the audio and video data for this thesis.

After introducing all facilitators (listed in the paragraph above) and confirming the setting and premise of the workshop, participants were invited to the first of two stations where the interactions with the robots happened was Amy's restaurant. Participants were encouraged to approach and interact with the robots, familiarising themselves with the technology. Amy's restaurant was one of the main squares on the campus, where the AFORA team set up a make-shift environment so that participants could control the robot and set up the operating map area. After that, participants learnt how to have Amy move and deliver items; they commanded it between the staging area and the kitchen and two different tables.

Participants were invited to actively control Amy's movement via a laptop keyboard, mapping the restaurant area, using her sensors scanning and the virtual map for her transit. Another activity was setting up the staging location, named kitchen, alluding to a natural work environment. The mapping and set-up also included entering table locations, virtual tracks for Amy to safely move around the obstacles, creating menu items, entering orders,

and commissioning Amy to perform deliveries. This was a simulation of restaurant staff and customers operating and interacting with the robot Amy.

On the second station, located in the Runeberg room, located in the Arcada UAS campus, participants were introduced to Alf, the social bot. Alf was programmed to perform a 'face check'; if its sensors detected a face, the robot delivered a message and asked a question: I have detected a face. Are you wearing a mask? That was the participants' initial interaction with Alf. Volunteers were asked to approach and touch Alf to trigger its sensors and reaction depending on what part of the robot was being touched. As a social robot, Alf is designed to interact with people and participate in activities. So, our participants were invited once more to approach Alf and ask it to play music and dance or project video games on the wall. At the same time, its sensors detected our volunteers and allowed them to play video games using their body movement to control the game avatars. On another app called Trumpet, Alf was programmed by participants to deliver messages triggered by face sensing.

In addition to a tablet located on the robot's body, Alf can be controlled via the Q-link app. The app is typically installed on a compatible Android-powered device and uses Wi-Fi to whisper commands to Alf remotely.

The Q-link app introduction to the event participants was done by the ethnographer, also the author of this thesis. Q-link enabled mobile device was handed to a few volunteers to allow them to operate Alf and try its features: moving, talking, expressing facial emotions, and others.

At the end of the workshop events, participants were given the survey and consent forms (see Appendix 2) to collect their input and insight on the experience after performing and watching other perform robot whispering activities.

3.5.2 The social and service bots, Amy and Alf

Amy was produced by the Suzhou Pangolin Robot Corp., Ltd., in China. Amy's primary functions are reception and hosting, autonomous food delivery, menu offering, intelligent navigation, dish delivery, return, and mobile advertisement.

Amy is a humanoid robot designed to perform deliveries as a waitress in the hospitality industry. However, it may also be configured to hold a larger touchscreen display that can be used to showcase content as intended by its employer. Amy is powered by an industrial personal computer to allow performance in different tasks.

Amy is 1500*560*810mm, weighing 56kg, maximum load capacity of 10kg, capable of achieving 0-0.7meters per second, endurance or up to 10 hours, with a charging time of 10hours or less. Battery capacity 20Ah.

The head is equipped with an LED display that emulates human-like facial expressions, depending on the tone of its message and set up by the programmer. A tablet-like high-definition display is located on the main body and is used to enter commands, set up, and view messages that may also be programmed. Amy is equipped with high bearing capacity arms, currently equipped with a two-level tray (see figure 4) designed to carry items from the pick-up location to the delivery destination, in this case, tables at a restaurant.

Amy has Lidar SLAM sensors that enable it to navigate designated areas avoiding obstacles perceived by the mechanism. The operator may designate points of interest, i.e., tables, staging (stand by) area, kitchen, reception, to name a few. Once set-up is completed and operation has started in a restaurant setting, the robot can function as a hostess or waitress. Guests can be greeted upon arrival and walked to the optimum table.

Alf is originally called Elf Sanbot S1(Sanbot 2021), is produced by Qihan Technology Co. Ltd, in China. Alf (see figure 4) is a social bot designed to act customer service point of contact in retail, hospitality, education, health care, entertainment, and security fields. This social robot is 902*331*421mm, weighing 19kg, capable of achieving 0.8 m/s, with a battery capacity of 20Ah/300W, an endurance of 4 hours or 10 hours on standby mode. Alf is also shaped like a humanoid and has facial expressions displayed on its head. Another high-definition display is located on the body and serves as a 10-inch touch screen for commanding and interacting with its features.

Alf is equipped with a gyroscope sensor, human-body induction sensors, infrared evading obstacle sensor, infrared message receiving sensors, touch sensors, and an electronic compass sensor. Alf can sense humans and initiate interactions depending on how it is programmed to perform. Alf has a projector that conveniently displays images on the ceiling or walls, including videos and games that users can use for entertainment. Alf can also detect faces and remember up to twenty friends once it stores the different facial features.

Figure 4. Alf (left) and Amy at Arcada

4 RESULTS FROM WORKSHOP DATA

This chapter presents the results from the empirical part of the research, i.e. the workshop data continues being analysed; first, the survey questionnaire results are reported, then a collection of observations of audio and video data collected regarding the operation of robots and their features will also be presented.

The first results show there are opportunities for use case studies and that familiarisation is necessary to develop trust and relevant use cases. People taking part in our first workshops all showed great interest and curiosity towards the robots.

At the workshop events, thirteen participants were all the students of Tourism and Service Design courses at Arcada. Some were working as a customer service representative, public relations manager, sales associate, logistic agent, and one in the financial services industry. While this sample was not large enough to represent the different industries, the respondents' experiences were varied enough to allow for insightful feedback regarding the applicability and acceptance of the humanoid robots.

4.1 Survey Questionnaire Results

The survey questionnaire was composed of twenty-two items. When asked about their previous experience with humanoid robots in person, most of the thirteen participants said they had previous experience, and a few of them said no, they did not have it. When asked if the workshop was the first time operating a humanoid robot, almost all answered yes, and very few answered no. These results were notable as they confirm a varied group of respondents observed as they interacted with Amy and Alf during the workshop event tasks.

When asked about whether they strongly disagreed or strongly agreed with Amy being employed in a restaurant context, all participants replied between agreed and strongly agreed. Their answers recognise Amy's design as a waiter or delivery agent.

The questionnaire also posed a question about the applicability of Amy in a hotel reception context, in which case our respondents largely agreed, except for one respondent who disagreed. It is important to note that, while the Amy used in this research is fitted with a double tray, the humanoid robot model is possible to be carrying a large display and function as a receptionist.

When asked about the possibility for Amy in an airport and train station context, our respondents once more were divided between disagreeing and strongly agreeing with the applicability of the robot in such context.

Our respondents were also asked whether they saw a possibility for Amy in a business office reception context, and the answers were from agreeing to strongly agree with the applicability in question.

There is a variation in the perception of how Amy may be employed; however, it is noticeable that our respondents did not strongly disagree with the options of employing Amy at a restaurant, hotel reception, airport, train station and business office reception.

4.1.1 Robots' Best Features

During the workshop presentation, AFORA Team members explained some of the robots' features and functions that would be purposefully used in the use case study. After the event, on the survey questionnaire, workshop participants provided their opinions on the best features or applications from an open-ended question. Here are their answers about Amy; the numbers in brackets represent the survey forms associated with respondents:

- “Delivering things, hand out samples etc.” [12]
- “It seemed fairly easy to use and seemed to map its surroundings well. The music was fun, and the service seemed to work.” [6]
- “The waiting part with music being played” [7]
- “that she was easy to handle” [5]
- “its ability to move on her own once the mapping has been done.” [10]
- “Its ability to serve tables” [8]
- “that you could put in the dishes” [11]

Here are some of the participants’ answers about Alf’s best features:

- “Alf talking back was funny, a humorous approach.” [1]
- “Understand facial expression” [3]
- “It is fun and communicating with robots gives a positive effect” [4]
- “that he could be fun to work with” [5]
- “The games and fact that you could touch him was fun.” [6]
- “The dance feature” [7]
- “its appearance and dancing.” [8]
- “his various abilities, for example dancing” [9]
- “The dancing mode and the welcoming mode.” [10]
- “that it could be fun, Alf could be in a hospital cheering up people.” [11]
- “mask check” [12]
- “the welcome & dance” [13]

4.2 Observations

In the following, the results from the observations (field notes, audio and video) are reported.

The initial attitude of the workshop participants indicated they were ready to interact and associate with the humanoids. This is noticeable at the start of one of the workshops when participants took turns in taking pictures, including when one participant did a shoulder hug and smiles that were observed during the photo session. See figures 5 and 6.

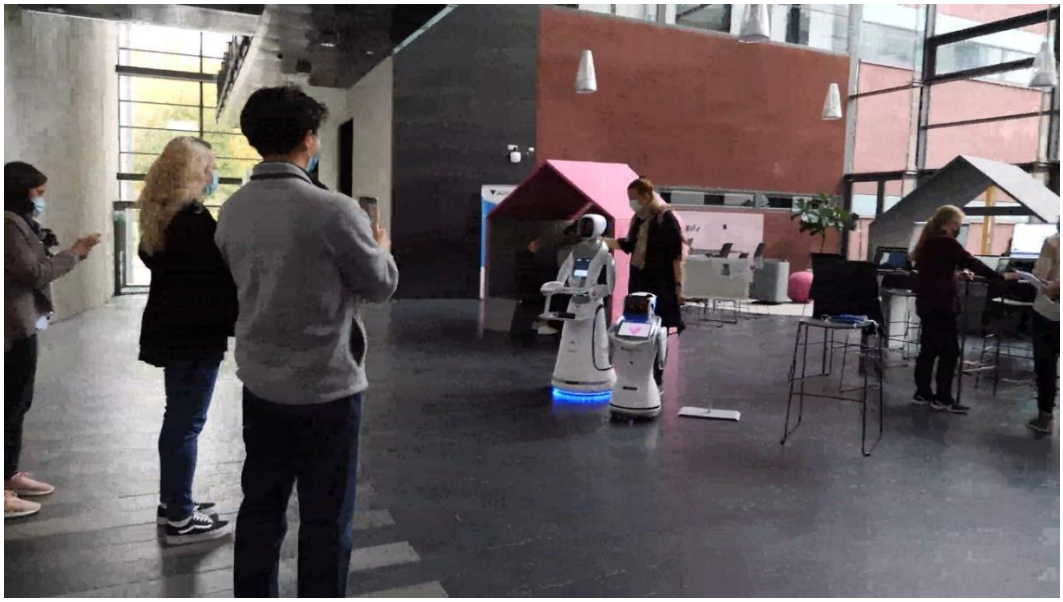

Figure 5. A participant poses with hand on Amy's shoulder

Figure 6. Another participant poses for a picture with Amy and Alf

4.2.1 Operating the Robots

During the workshop, participants were observed while operating various functions of Amy. They were asked to control Amy's movement in the designated Amy's Restaurant while its sensors scanned the area and mapped the obstacles existent. On two different occasions, there were noticeable giggles by some participants, with the novelty of such task and while observing others take on the controls.

As participants were instructed on how to map Amy's restaurant, within a few moves and turns of the robot, they started showing more confidence and sharpness in moving the robot from point A to B. Participants were also asked to enter a staging location, where Amy would wait, a kitchen area where to pick up items for delivery, tables where hypothetical customers were seating, as well as entering menu items. Once those tasks were done, participants were asked to enter orders and send the robot on its way to deliver those. As Amy played classical music during the delivery, participants were once more amused and smiling along with the activity. Considering the music is optional and can be programmed to preference, this is a key point in the experience, as it distinguishes the usual delivery of food by humans.

After the task instructions and initial hands-on experience with controlling Amy, participants agreed or strongly agreed that learning and controlling were an easy task. This is also confirmation that technology has advanced and allowed access to non-specialists to reach and take on the use of such tools.

While all participants succeeded in performing the tasks suggested, two of the participants who best controlled the direction of Amy's movements were frequent gamers, and that may have impacted their ability to send the robot on its way accurately. Their hands were on the control computer while their eyes were focused on the robots' positioning. This tactic can be reapplied in helping future users learn and get acclimated with Amy's controls.

During the workshop, participants were also observed while operating various functions of the social robot Alf. Alf's mask check function was turned on, and one of the participants approached it to test it by removing the mask so Alf could sense the mask was missing. The participant removed the mask and revealed a smile; this is relatively constant in interactions with Alf. The robot sensed the face and announced: "I detected a face. Are you sure you are wearing a mask?" Alf is heard on audio recording data.

Because Alf is powered by the Android operating system and comes equipped with apps, the usability is very familiar to our participants who already have experiences with smartphones systems. So, choosing Alf's functions from its control screen is much like using a tablet. A participant can be seen entering a command on Alf's interface (see Figure 7) while others are watching the task unfold.

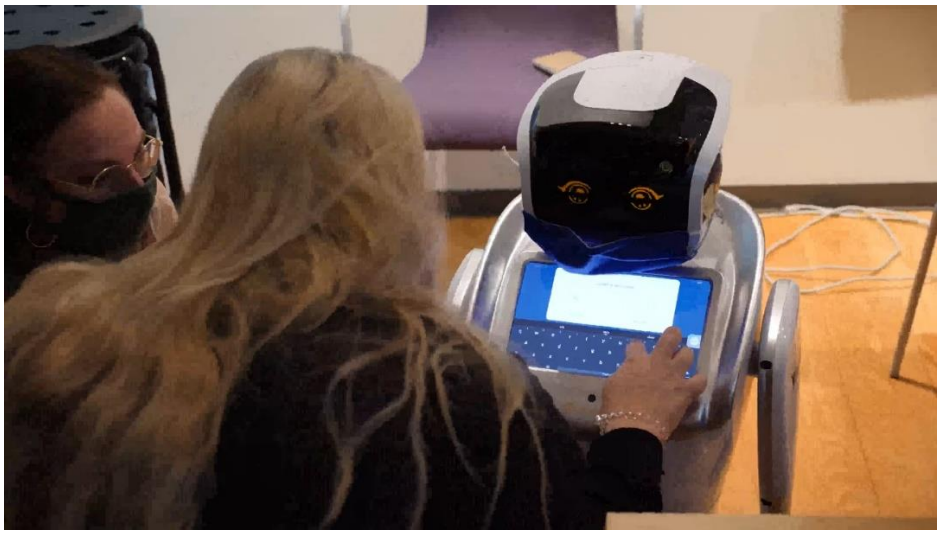

Figure 7. The participant enters a command on Alf while others watch

One of the uses for Alf is as an entertainer. It is capable of projecting images onto a wall or ceiling, playing movies, games, or images from another location. Our participants were given a chance to play games with Alf, so it projected the game images on the wall while its sensors detected the player's body movements as commands. This was an excellent

example of Alf's functionality with entertaining young children and adult children, for volunteers were both eager and happy after playing with Alf.

On table 2, the main points about Amy and Alf's operation activity are listed.

Table 2. Operating the Bots Summary Points

Summary of points about Amy	Summary of points about Alf
Giggling users, it is possible the participants were having fun observing peers control the robot.	The Android-powered system makes for seamless operation on its touchscreen, similar to smartphones OS.
Amy's restaurant operation area is simple and can be done with basic steps already available on its programming.	The projector makes for easy entertainment for its users, with options for playing games or watching video content.
Music played during deliveries amused participants.	
When controlling Amy's moves focusing on its location rather than computer controls makes for smoother operation.	

4.2.2 Robots Health and Safety Applications

The data set was collected during November and December of 2020, months after the Covid-19 pandemic safety restrictions and recommendations were in place. So, the subjects of wearing masks, maintaining physical distance, exposure at work, and other safety concerns were present on observations from the workshop.

When asked for their opinions on where these robots could be employed other than the settings listed on the questions, one respondent suggested “at home to watch (the) kids as security. Maybe at hospitals to guide patients or to deliver medicine or instructions.” [6] Another respondent suggesting using the robot as an alternative to a human at reception or deliver goods and help comply with “social distancing – sending a robot instead” [1].

Health safety concerns were also present on another respondent to suggest employing Amy “in schools, for example remembering people to wear a mask” [11]. These responses indicate that the survey respondents share a sense of usability of these two humanoids towards employing them in the suggested positions. During our use case workshop, Alf performed a welcome message, reminding everyone to wear masks using its function to detect faces to trigger the message.

Figure 8. Alf wearing a face mask

As service robots will be in close physical contact with users, the AFORA team considered a proposal to assign an account on koronavilkku.fi for Alf. “Koronavilkku is a contact tracing app produced by the Finnish Institute for Health and Welfare (THL) to help you find out whether you may have been exposed to coronavirus(THL 2020).” This

would be a way to participate in tracking clusters in case a user has been in contact with the robots for sufficient time. As mentioned on the Finnish Institute for Health and Welfare's website, “according to current information, the role of contaminated surfaces in the spread of the virus is not significant”(THL 2021). While the initiative was not applied, Alf participated in the workshop events wearing a symbolic mask (see figure 8).

Amy and Alf have the potential to play a role in the safety and security whenever applicable. See table 3.

Table 3. Safety and security points about Amy and Alf

Both Amy and Alf can
• Perform tasks that would otherwise be done by a human. By sending the humanoids, unnecessary human-to-human contact can be avoided.
• Robots and other social and service technologies that are in physical contact with humans may be a part of contact tracing efforts in future events in case surfaces can become contaminated with pathogens that may be communicable via the robot’s touchable surfaces.

4.2.3 Feelings towards the robots

Amy’s design determines how the users felt about the interaction, mostly acting interested and attentive to instructions. In one of the video clips, participants were just asked to take control of Amy’s movements. The author observed there was hesitation by a participant, who suggested others took in the opportunity. As none of the participants who were offered took it, another came from the back of the group and started controlling the robot.

In another instant, the AFORA Team was explaining a feature of Amy, and two participants were observed whispering to each other and giggling. The situation did not allow for clarification on the subject, yet the event was noted by the author.

Also, during one of Amy's workshop, a student who was not part of the invited participants was observed watching the explanations and tasks being done. This was noted by the author during the event as well as while reviewing the video data.

Laughter was a frequent event during Alf's workshop. This came up as an emerging theme during the thematic analysis completed by the author. It is important to note that laughter was observed more explicitly on Alf's portion of the workshop, with fifteen occurrences captured on audio data. The participants' emotional reaction to Alf was noticeably partial when compared to Amy's. See table 4.

Table 4. List of participants' emotional reactions

List of participant emotional reactions	
About Amy	**About Alf**
The use of music is fun	Funny/Humorous
Welcoming/hospitable	Empathy/facial expression
	Positive effect
	Fun to work with
	Playing its games is fun
	Fun/cheering
	Welcoming/hospitable

When discussing Alf's facial expressions and whether she would pass by Alf without stopping, one of the participants exclamations: "…I get a little sting of guilt for passing out and like not doing it."(P6) While the facial expressions are evidently an electronic display, this user attached emotion and possible reaction to meeting Alf in the field. With that in mind, Amy and Alf are humanoids, somewhat shaped like humans, with a body, head, limbs, and other features that mimic human physiology. Both AFORA humanoids can display facial expressions to indicate emotions to improve the interaction with humans (Tung and Law 2017).

5 DISCUSSION AND CONCLUSION

This thesis aimed to find how service and social robots, Amy and Alf, are accepted and can be used within the hospitality industry. The primary data collected during the workshops, and themes gathered during the processing of said data set, has helped compose the answers.

How are social and service robots seen as possible purposeful agents in the service sector?

The findings in this thesis help the case for deploying humanoids instead of humans, in some cases, to cause a positive impact on tasks that need to be performed, relieving human employees to take on more challenging tasks (Ivanov and Webster 2019:13).

During our workshop on Amy's restaurant setting, users took turns during the set-up as well as during the deployment of Amy. The tasks were performed efficiently and directly once the input was given. As observed from one of the video data files, right after the command, Amy spins around and goes on to deliver the items to a pre-set table location.

As AI technology continues to become more capable, the applicability of delivery robots like Amy in the hospitality sector should also evolve (Ivanov and Webster 2019:13).

The workshop participants were receptive to controlling, teaching, and interacting with the humanoids because they knew this was part of the function of our workshop, as well as because Amy and Alf were ready to apply their features to the event and tasks that were performed. So the perceived usefulness factor is related to the participants' attitude (Go et al. 2019:5). This supports the conclusion that how informed users are, as well as how ready humanoids are, will play a definite role in the success of deploying humanoid robots in a productive realm.

What features are seen as useful in a service context?

From the information mentioned in previous research, listed in this thesis under chapter two, we can understand that some key features make the perception and acceptance of humanoids by customers easier whenever those features are relatable, like facial expressions, humour, sarcasm, being ready and programmed to learn or perform tasks that are expected in the real-life application.

Our participants took pictures with the humanoids before the start of the workshop event. One of the participants rested her arm on Amy's shoulder and smiled for the camera, just like it is commonly done whenever posing with friends (Tung and Au 2018:3). Amy's body is of considerable height and this design feature may have influenced the participant pose for the photo. The power of physical presence-embodiment was also evident when AFORA workshop participants interacted with humanoids and reacted to their facial and verbal expressions, to the extent of possibly influencing the experience as a whole (Tung and Law 2017:7).

Amy and Alf were equipped with the features that eased the tasks being performed by novice users, our participants, at the workshop events. Amy had the correct hardware to

wait tables and work at a setting where customers need to place orders, receive items, and possibly return some of those items using Amy's trays.

For the humanoid operators, Amy had the programming needed to set up a digital restaurant environment, complete with a staging area for Amy, set-up of menu items, table locations, travel lanes for the humanoid, facial expressions to appease users and, more importantly, promote recognition of commonality during human-robot interaction (Tung and Law 2017:8–9).

Alf is pre-programmed to perform more of socialising role. This was evident when the group erupted in laughter multiple times during Alf's session of the workshop. The nuances that were already present on the communication set-up, as well as some errors of the speech recognition feature, helped make Alf a humanoid that performed very well in causing an impression on the participants and possibly stimulating the intention to use (Go et al. 2019:5). The number of times laughter was recorded help this assertion. It is fair to say that sarcasm and humoristic replies made for a very sociable humanoid. When asked what the best feature of Alf is, a participant mentioned that Alf talking back was funny, a humorous approach, a very human-like way to interact and well received by participants during the occurrence. On another occasion, a participant explained that when it comes to the facial expressions as well as the name of the humanoid, this is a direct indication that features like facial expressions and naming humanoid robots does have a tangible impact on how they are perceived and accepted to perform with humans.

Conclusion

This thesis is comprised of the two Humanoids Amy and Alf, as well as primary data gathered in the AFORA workshop events and processed by the author to the best of his capacity. While the findings presented here cannot be generalized to encompass the broad stroke of what humanoids and robots available in the market, they may be used towards

better practising the application and employment of these two humanoids purposefully and usefully.

When deploying Amy, the workshop event limited the use case of a restaurant, so there is an opportunity to test her efficacy in other settings, like business office lobby, storefront attendance, and others. Alf was tasked to entertain the workshop participants with games, show some of its feature functions, and playingly interact with users. Alf may also be further tested in different settings, especially whenever customers may need information, guidance, and plain time passing with games, humoristic conversations, and others. The opportunity for further research on how to efficiently employ Amy, Alf and other humanoids is still existent and may be taken upon by future researchers in the quest for best practices and understanding.

In conclusion, there are still many opportunities to understand and develop customer experiences with these two humanoids. The effective use of such tools can lead to more productive teams and better-served customers on various types of businesses.

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APPENDIX 1. SURVEY QUESTIONNAIRE

AFORA

Questions Responses 13

Section 1 of 4

AFORA Workshop Survey Fall 2020: Human-robot interaction in hospitality

This survey aims to collect the insights of participants, regarding their experience with the AFORA robots, Amy and Alf. The data will be used in research HRI (robot-human interaction) in a service contexts. All data is treated confidentially, and research ethics are strictly followed (see: www.tenk.fi).

What is your profession? *

Short answer text

Which age group describes you? *

1. 18 to 29
2. 30 to 39

4. 50 to 59
5. 60 to 69
6. 70-

Is this your first interaction with a humanoid social or service robot? *

- Yes
- No

Is this the first time you see humanoid robots in person? *

- Yes
- No

Is this the first time you try to operate or train a humanoid robot? *

- Yes
- No
- Other, please explain
- Other...

After section 1 Continue to next section

The following statements are about the possibilities you see for Amy (waiter).

Please consider your interactions with Amy, as well as where and how Amy could be useful.

I see Possibility for Amy in

Description (optional)

... a restaurant context! *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

... a hotel Reception! *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

... an airport! *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

... a train station! *

... a business office reception! *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

If anywhere else, please explain/elaborate.

Long answer text

The interaction with Amy was easy! *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

The training (robot whispering, making it work, move, do things) of Amy was easy! *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

The best features or applications with Amy were: *

Long answer text

Continue to next section

Section 3 of 4

The following statements are about the possibilities you see for Alf (social bot).

Please consider your interactions with Alf when addressing the following statements and questions.

The interaction with Alf was easy! *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

The training (robot whispering, making it work, move, do things) of Alf was easy! *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

The best features or applications with Alf were: *

Long answer text

After section 3 Continue to next section

Section 4 of 4

Service Bots when addressing the following statements and question.

Description (optional)

Human features are important for robots in a service context! *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Facial expressions are important for robots in a service context! *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Speech and understanding speech is important for robots in a service context! *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

I believe that social and service robots will be useful/used in hospitality services in the future! *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Long answer text

APPENDIX 2. INFORMED CONSENT

Thank You for taking part in our survey.

The data will used in research HRI (robot human interaction) in service contexts. All data is treated confidentially, and research ethics are strictly followed (www.tenk.fi).

For **more information** about the AFORA social robots project:

Website: E-mail: christa.tigerstedt@arcada.fi , Phone: +358 50 354 1111, Instagram: amyandalf

INFORMED CONSENT

I hereby give consent for my survey data to be used in the AFORA social robots research. I understand that the information will be used solely to improve current understanding of robot interaction and social and service robots us case development in the service sector. I understand that my personal details will not be used for any other purpose than these and will not be included in study outcomes.

Name of respondent (please print):_____

Signature of respondent:_____

Place, Date:_____

** Person signing must be 18 years of age or over

For more information about the AFORA social robots project (project owner, responsible for research):

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