

Meeting *Stevie*: Perceptions of a socially assistive robot by residents and staff in a long-term care facility.

Conor McGinn Eamonn Bourke Andrew Murtagh Cian Donovan Michael F. Cullinan
School of Engineering School of Engineering School of Engineering School of Engineering School of Engineering
Trinity College Dublin Trinity College Dublin Trinity College Dublin Trinity College Dublin Trinity College Dublin
Dublin, Ireland Dublin, Ireland Dublin, Ireland Dublin, Ireland Dublin, Ireland
mcginnc@tcd.ie

Abstract—Socially assistive robots (SARs) have the potential to improve working conditions of care workers, empower vulnerable people to retain independence, and even provide social companionship. Through a series of focus groups, this study explores how older adults and professional care workers in a Continued Care Retirement Community (CCRC) perceived a bespoke SAR platform known as *Stevie*. Using a mixed-method approach, it emerged that both care staff and residents developed a strong fondness for the robot, perceived it to be useful, and could envision a range of useful applications.

Index Terms—social robot; godspeed; *Stevie* robot; eldercare; perception

I. INTRODUCTION

Long-term care facilities face many challenges, such as large operation costs, high employee turnover and an increasing labour shortage. As such, there is a growing need for new technologies, such as robots, that can perform useful tasks to empower care workers, help older adults maintain independence and possibly provide companionship.

In recent years, a rapidly changing technological landscape has driven new technologies, like robotics and artificial intelligence, into the homes of laypeople. The commoditization of formerly ‘high-tech’ research equipment, combined with greater technological literacy among citizens, demonstrates that there is an on-going need to conduct studies which investigate how assistive robots are perceived by older adults. Furthermore, as new robots are developed, it is critically important that experiential, as well as utilitarian, aspects of their design are evaluated by users.

The goal of this research was to explore, through a series of focus groups, how a socially assistive robot (SAR), known as *Stevie*, was perceived by residents and care staff at a long-term care facility in the US. This research thus addresses the need to explore the perception of new robot technology by target end-users, while also investigating experiential and design-related aspects of a bespoke SAR platform.

This project has received funding from Enterprise Ireland (project CF-20170695), through the European Region Development Fund.

II. METHODS

The research was conducted in a Continued Care Retirement Community (CCRC) located on the east coast of the US. Unlike traditional care homes, CCRCs offer supports to a continuum of aging care needs. The facility was somewhat unique because nearly all the residents had formerly served (or had a spouse that served) in the US military. The robot used in this study was a bespoke SAR, known as *Stevie* (Fig. 1). *Stevie* can move on wheels and has a range of sensors to perceive its surroundings. It can engage in social interaction through a combination of gesture, speech and facial expressions. More details on the design of the robot can be found in [1].



Fig. 1. Photo of *Stevie* during a focus group session.

The first focus group was held with older adults living in the independent living facility of the CCRC. These participants (4 male, 6 female) were recruited with the assistance of the voluntary resident committee and no payment was given for taking part in the study. Focus groups were audio-taped, and observation notes were recorded. A second focus group was held with senior nursing staff (5 female) employed across independent living, assisted living, memory care, and skilled nursing care sections of the facility. Ethical approval to conduct the focus groups was attained by the university research

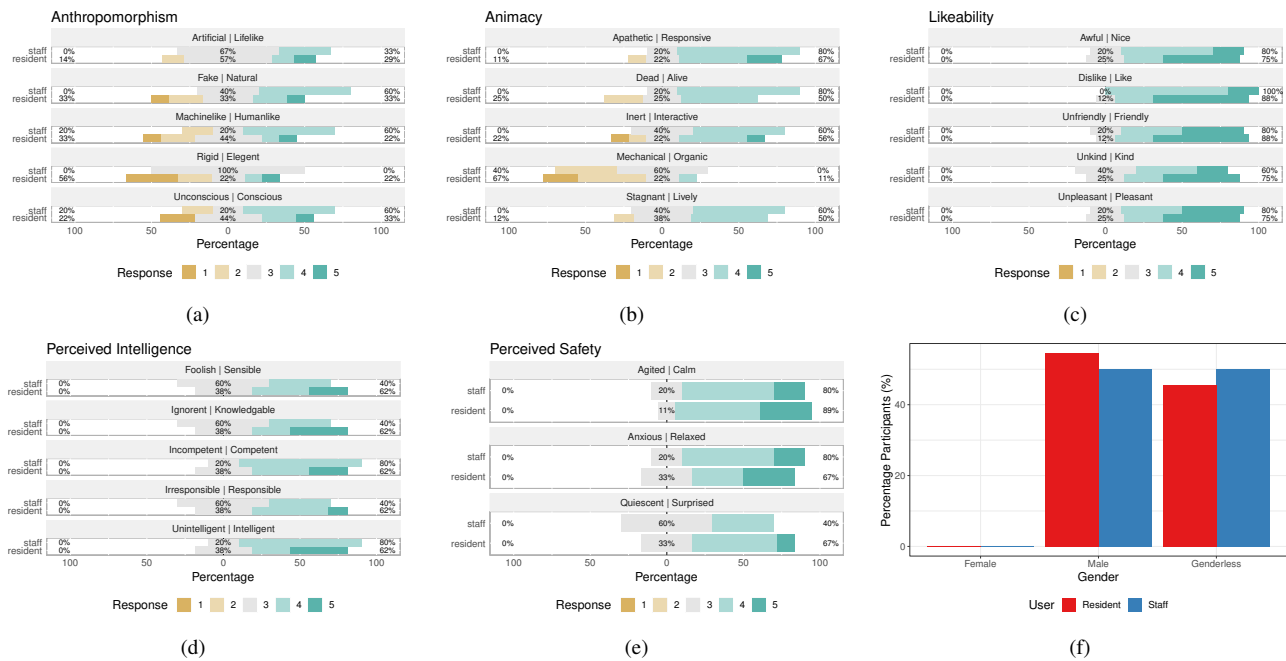


Fig. 2. Perception of *Stevie* by residents and care staff using Godspeed scales (a) anthropomorphism, (b) animacy, (c) likeability, (d) perceived intelligence, (e) perceived safety, and (f) perceived robot gender.

ethics committee, and written informed consent was provided by each participant prior to each of the focus groups.

III. FINDINGS

The focus groups began with a short (<5 minute) informal presentation about the background of the study. Following this, *Stevie* was driven out and introduced to the participants. The robot was teleoperated for the full duration of the session; this fact was communicated clearly to the participants early in the focus group. The sessions followed an inquiry-based structure and where possible, the direction of the conversation was led by the participants.

A thematic analysis was undertaken using the observation notes and a transcript of the focus groups. The first major theme that emerged among residents was ‘curiosity’. Residents asked questions such as “why wasn’t the head round”, “how would it get in a lift”, and “how do the sensors work”. There was also a theme of mild concern for themselves and/or other residents. (i.e. “what would happen if it crashed”), but also for the robot itself (i.e. one resident showed concern the robot might have trouble navigating over carpet). A third theme that emerged related to the ‘animacy’ of the robot. Overall, the female residents tended view the robot like a living thing and referred to it using words like “cute”. Conversely, the men tended to view the robot as an object. For example, one man compared it with a “hospital medical dispenser”. The focus groups with staff revealed a more pronounced theme of concern. Staff identified the noise the robot made, its non-sterile textile surface, and its short arms as features that may cause problems to adoption. Despite any issues raised, both

staff and residents saw the potential utility of the robot, and suggested many (20+) possible use-cases.

To gain a quantitative measurement of how the robot was perceived, participants completed a Godspeed questionnaire [2] at the end of each session. This measure generates useful data which supports benchmarking with other robots, provides an initial baseline for future comparison, and may inform the future (re)design of the robot. Participants were also asked to identify the perceived gender of the robot. A post-test analysis revealed that one of the residents failed to successfully complete the Godspeed questionnaires (only one answer completed per section) and two occasions other users left a section blank: anthropomorphism (n=9), animacy (n=9), likeability (n=8), perceived intelligence (n=8) and perceived safety (n=9). Questionnaires completed by care staff were all completed correctly (n=5). All of the five categories were found to be reliable for both residents and staff (Cronbachs alpha >0.7). Results from the questionnaire and gender question are presented in figure 2.

The findings from this study inform on-going research which includes the design of a new robot platform, a long-term pilot study in a CCRC, and the development of teleoperated control systems for social robots, among others.

REFERENCES

- [1] C. McGinn, E. Bourke, A. Murtagh, M. F. Cullinan, and K. Kelly, “Exploring the application of “design thinking” to the development of service robot technology,” in *ICRA2018 Workshop on Elderly Care Robotics - Technology and Ethics (WELCARO)*, 2018.
- [2] C. Bartneck, D. Kulić, E. Croft, and S. Zoghbi, “Measurement instruments for the anthropomorphism, animacy, likeability, perceived intelligence, and perceived safety of robots,” *International journal of social robotics*, vol. 1, no. 1, pp. 71–81, 2009.