Supporting "Stop and Watch" in Elderly Care with Socially Assistive Robots: Insights from a Participatory Design Workshop

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Abstract

"Stop and Watch" is an early-warning tool adopted by the UK NHS and is widely used in elderly care settings. The tool helps caregivers to recognise abnormal changes in residents' health. Despite its clinical value, the process remains highly manual, workload-intensive, and vulnerable to missed observations, particularly in environments facing staff shortages, frequent staff rotations, and increasing care demands. We argue that AI-based systems such as Socially Assistive Robots (SARs) and Assistive Living Technologies (ALTs) offer promising avenues for supporting and enhancing the "Stop and Watch" tool. However, designing such systems requires a multidisciplinary effort to establish a comprehensive understanding of current practices and the priorities and concerns of all relevant stakeholders. This paper presents insights from a participatory design workshop held in a care home in the UK to explore how SARs and ALTs could meaningfully support the "Stop and Watch" tool, understand stakeholders' expectations, perceived benefits, and concerns regarding deployment in this sensitive context.

CCS Concepts

• **Human-centered computing → Interaction design**.

Keywords

socially assistive robots, assistive living technologies, elderly care

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1 Introduction

By 2050 the global population aged 60 and over is projected to double to 2.1 billion [26]. Many countries are experiencing significant population ageing, with demographic distributions steadily shifting toward older adults. At the same time, care homes face severe workforce shortages. In the UK, 71% of care-home providers report major recruitment difficulties [24], and an estimated additional 488, 000 healthcare staff will be needed by 2030 [21]. Moreover, modern lifestyles, combined with rapid population ageing, have increased the number of individuals living alone and requiring care support [3, 19], placing growing pressure on healthcare systems to support both the physical and emotional well-being of the expanding ageing population.

Socially Assistive Robots (SARs) and Assistive Living Technologies (ALTs) are becoming increasingly prevalent in everyday environments. These technologies have the potential to enhance quality of life by enabling socially responsive, intelligent, and adaptive living settings [20]. When implemented effectively, SARs and ALTs can serve as a crucial support bridge for independent living and elderly care. They can help older adults, including individuals with cognitive decline or dementia, remain socially connected, maintain daily routines, and receive timely assistance when early changes in behaviour or health arise [1, 12]. These systems can also reduce caregiver workload by supporting monitoring, communication, and early detection of potential health concerns [5].

This paper contributes our insights from a participatory workshop conducted with our key stakeholders as a multidisciplinary effort to disentangle many interrelated factors behind the success of their well-established "Stop and Watch" practice in a care home in the UK [8, 18]. Importantly, the study also identifies the potential for SARs and ALTs to be integrated into this practice, together with the priorities and concerns of the stakeholders who would ultimately use or be affected by such systems.

2 Background

2.1 SARs and ALTs

Assistive Living Technologies (ALTs). The literature provides a handful of observations on the impact of different ALTs on the lives of senior adults. The work [17] surveys wearable Internet of Things (IoT) sensors and edge/cloud-enabled devices applied to elderly care. The study suggests that ALTs can function as predictive medical tools and digital biomarkers that support home-based care and improve clinical research. In [16], the review highlights that for many older adults, smart technologies (broadly defined: IoT, wearables, smart-home systems, assistive devices, tele-health) can help maintain autonomy, support chronic condition management or rehabilitation, and promote well-being. More recently, the study [14] investigates ALTs designed to support senior citizens, focusing on user-centred and contextual designs. The paper recommends, among others, participatory design with older adults, modular affordable products, and policy measures to improve access. Finally, the paper positions ALTs as part of an ecosystem that integrates devices, services, caregivers, and community resources for effective ageing-in-place.

In the broader domain of healthcare, the study [11] demonstrates that technology can increase independence and allow remote clinical oversight, but success depends on workflow fit and caregiver involvement. Notably, the study [11] discusses non-technical obstacles, including regulatory and privacy/legal issues that slow scaling beyond pilot projects. The work [7] examines recent advances in wearable hardware that enable non-invasive, continuous monitoring of both physical activity and health status, focusing on older or impaired adults. The authors highlight that consistency in real-world deployments remains an open challenge.

Socially Assistive Robots (SARs). SARs offer unique capabilities that complement ALTs by engaging directly with residents, encouraging them to maintain their daily routines, and supporting social connectedness [5]. Their potential is particularly relevant in elderly care contexts where older adults may live alone or experience limited opportunities for meaningful social interaction, as well as in care homes facing staff shortages or frequent staff rotations [4, 5].

The CARESSES project represents an international and multidisciplinary effort aimed at designing, developing, and evaluating SARs that can improve health and well-being related outcomes among older adults residing long-term care homes in UK and Japan [13]. Recent research continues to expand the role of SARs in supporting independent living. In the MORPHIA project [25], SARs were designed to help older adults maintain connections with family, friends, and caregivers, addressing the needs of individuals, especially those with impairments-living alone in their home environments. Beyond social communication, Nguyen et al. [10] proposed an LLM-based multi-agent framework that enables SARs to coordinate with a range of smart-home sensors and actuators to deliver both assistive functions and socially interactive support. Such integration illustrates the potential for deploying SARs within care home settings, where SARs and ALTs can jointly enhance early detection, user engagement, and the consistent delivery of elderly care.

2.2 Stop and Watch

"Stop and Watch" is an early-warning tool used in social and healthcare settings to recognise and escalate signs of a person's deterioration [8, 18]. Caregivers often follow the "Stop and Watch" technique to monitor and record individuals' behaviour, as it allows them to identify subtle signs that an individual is becoming unwell or their health is deteriorating. This early detected deterioration admits faster response and on-time professional assistance. Despite its clinical value, the current practice relies heavily on caregivers manually observing and interpreting behaviour in order to detect emerging deterioration patterns. This process remains highly workload-intensive, and vulnerable to missed or inconsistent observations, particularly in environments facing staff shortages, frequent staff rotations, and increasing care demands. In practice, the quality and consistency of "Stop and Watch" reporting often vary depending on individual interpretation, experience, and attentional load. Moreover, manual observations are not always recorded in a structured or standardised format during staff handovers, which can undermine continuity of care and inhibit effective knowledge exchange.

2.3 ALTs and SARs for Stop and Watch

The proliferation of ALTs and relevant smart health devices, together with the steadily increasing number of older adults who are familiar with AI technologies, suggests that integrating AI-powered systems into "Stop and Watch" practices will become progressively more feasible in the near future. In IoT-based elderly-care settings [2], the combination of computer vision, multimodal sensing, and user-centred AI techniques enables effective monitoring of abnormal changes in residents' health, nutrition, and daily routines. These capabilities align closely with the "Stop and Watch"tool, particularly with practices associated with the "S, P, A, N, D, W, T, C, H" categories [18].

Indeed, SARs demonstrate strong potential for engaging directly with residents in their daily routines and providing social or emotional support [13, 23], which corresponds closely to several "S, T, O, A, C" indicators illustrated in "Stop and Watch" tool [18]. Furthermore, recent advances in multimodal Large Language Models (LLMs) offer new opportunities for understanding residents' verbal and non-verbal behaviours in everyday contexts and for reasoning about appropriate social and physical supports [10]. Together, these developments highlight the potential for deploying SARs and ALTs within IoT-enabled independent-living or care-home environments to support the "Stop and Watch" practice, enhance user engagement, and improve the consistency of elderly-care delivery.

Despite the growing capability of relevant technologies, to the best of our knowledge, SARs and ALTs have not yet been widely or systematically applied to support the "Stop and Watch" process in early-care contexts. Deploying such technologies in elderly-care environments requires a multidisciplinary effort and a deeply situated understanding of the everyday practices, priorities, and constraints of the many stakeholders who would ultimately use or be affected by these systems. Our participatory design approach aims to address this gap by providing a structured method for co-creating technology with stakeholders. This process enables participants to articulate needs, expectations, and concerns that may otherwise remain tacit or overlooked. By involving key stakeholders early and meaningfully, the approach increases the likelihood that SARs and ALTs will augment-rather than disrupt-existing care practices. Such co-creation not only fosters acceptance and trust but also supports the development of an effective and sustainable SAR-supported "Stop and Watch" intervention.

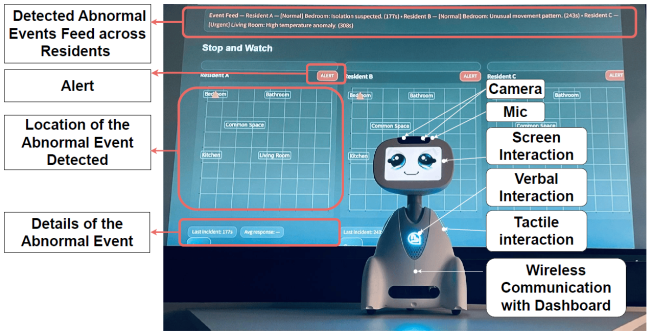

Figure 1: A proof-of-concept SAR for "Stop and Watch" integrated with a dashboard for data monitoring and management.

3 Participatory Design Workshop

3.1 Participants

The workshop involved 21 participants (female: 8, male: 13), from five groups of stakeholders.

- Medical Professional: This group includes caregivers and nurses who work directly with residents. They are expected to provide insights into the challenges and day-to-day implementation of the “Stop and Watch” practice.
- Care Technologists: This group includes professionals responsible for selecting, configuring, and maintaining ALTs. They are expected to provide perspectives on technical feasibility, integration needs, and practical considerations for deploying SARs and related technologies into their current system.
- Information Governance: This group includes professionals responsible for data-handling, privacy, and security compliance. They are expected to provide guidance on ethical implementation, consent processes, and safeguards for protecting residents’ information.
- Care Home Directors and Managers: This group includes senior leaders across different departments. They are expected to provide strategic perspectives on organisational priorities, resource allocation, and how the deployment of SARs and ALTs aligns with broader care-home goals, staff capacity, and long-term service planning.
- Researchers: This group includes five AI and Robotics researchers with expertise in SARs and ALTs. They are expected to translate workshop insights into system design requirements, and ensure that the resulting technologies meaningfully support the “Stop and Watch” practice while remaining feasible, acceptable, and appropriately tailored to the operational context of UK care homes and the particular needs of our stakeholders.

3.2 Materials

A storyboard illustrating a typical daily routine of an older adult and key personal care events was provided, as this method is commonly used in this domain [15]. A proof-of-concept demonstration of a SAR-supported “Stop and Watch” system integrated with a dashboard was also presented to participants (Fig. 1). In this demo, the Buddy robot was equipped with basic multimodal human–robot interaction (HRI) capabilities, enabling it to communicate with participants and detect abnormal events through multiple channels. Data collected by the robot was transmitted wirelessly to the dashboard, where it could be monitored and managed. This demo enabled participants to envision how SARs and related technologies might function in this context and to reflect on potential design requirements. In addition, two types of social robots commonly used in healthcare, Buddy [9] and LOVOT [6], were showcased to prompt discussion on robot embodiment, perception, and communication abilities.

Participants were invited to give feedback on these materials using semi-structured questions from the topic guide, focusing on how SARs and ALTs could support independent living and elderly care. Several key themes were explored during the discussion, including daily caregiver workload, existing "Stop and Watch" practice, the potential role of ALTs and SARs, system design considerations, decision-making processes and corresponding responsibilities, user expectations, acceptability, and data privacy considerations. These topics represent critical factors that must be considered early in the design process to inform the development of assistive systems in this domain [15, 22].

3.3 Workshop Sessions

The workshop comprised two structured sessions, with each group seated around a table alongside a designated facilitator. In the first session, participants were introduced to the storyboard, which illustrated a typical day and key care events for an older adult. This was followed by semi-structured questions aimed at understanding participants’ day-to-day experiences of implementing the “Stop and Watch” practice, as well as their views on the potential roles of ALTs, SARs, and relevant passive sensing techniques in supporting early care.

The second session began with a proof-of-concept demonstration of the “Stop and Watch” intervention integrated with a dashboard, along with presentations of the Buddy and LOVOT robots as examples of social robot embodiments. This was followed by semi-structured questions and discussions focusing on design considerations, decision-making processes, caregiver and assistive system responsibilities, user expectations, acceptability, and data-privacy considerations.

3.4 Data Analysis

Each table was facilitated by a researcher who guided the discussion using semi-structured interview prompts covering the topics outlined in Section 3.2. Discussion were also recorded, ensuring that unclear or incomplete notes were complemented and validated. All qualitative data were then digitised and organised for analysis. We conducted a clustering process in which comments were grouped into different clusters, allowing us to examine commonalities, differences, interrelationships, and the frequency with which particular viewpoints were expressed.

4 Insights from Stakeholders

This section presents our preliminary, yet informative insights obtained by the different stakeholders during both sessions of our workshop. We conceptualise the feedback across three categories.

4.1 Functionality Design

SARs and ALTs present significant opportunities for enhancing daily care practices in residential elderly care environments. Insights from our workshop emphasised that the design of such technologies must align closely with the practical workflows and unmet needs of frontline care staff. Participants highlighted that AI-powered systems should be capable of performing routine clinical observations, such as measuring vital signs, to reduce manual workload and ensure timely monitoring. They also expressed that SARs or ambient ALTs could support night-time checks by observing residents without physically entering rooms, helping to prevent unnecessary sleep disruption while still ensuring safety.

Participants further noted that SARs and ALTs could meaningfully enhance the early-warning tool "Stop and Watch", if equipped with the ability to track and interpret changes over time. They saw clear value in AI systems detecting patterns such as missed meals or decreased fluid intake, mobility decline, mood changes indicative of loneliness or depression, reduced social interaction or conversation, unintentional weight loss, and increased frequency of falls. Because these indicators often manifest subtly and accumulate gradually, staff believed that AI-supported monitoring could improve the accuracy and timeliness of recognising deterioration. In this way, SARs and ALTs were viewed not as replacements for human carers but as tools that strengthen proactive care, enabling earlier interventions to support residents' well-being.

Participants voiced several limitations and concerns that must be considered in future design and deployment. They questioned whether SARs could reliably navigate around both static and moving obstacles in tight or crowded care-home environments, where residents, equipment, and furniture frequently shift. Maintenance was another prominent concern, particularly regarding who would be responsible for troubleshooting failures—tasks that staff feared could create additional burden rather than reduce workload. Addressing these limitations is essential for ensuring that SARs and ALTs become practical, trusted tools rather than added complications in daily care-giving.

4.2 Robot Embodiment and Behaviours

Participants stressed that SARs should have a comforting and approachable appearance and be physically pleasant to touch, avoiding overly rigid or mechanical form factors. They also emphasised that the robot's voice and sound cues should be soothing and non-intrusive to prevent anxiety or irritation among residents. For ALTs, participants noted concerns about whether such technologies could be deployed within pre-existing care home environments without requiring disruptive infrastructural changes. They additionally highlighted that all user interfaces—across both SARs and ALTs—must be intuitive, simple, and accessible, accounting for the cognitive limitations that some residents may experience due to conditions such as dementia. These insights underscore the importance of designing technologies that integrate seamlessly into both the physical and cognitive landscape of care homes.

4.3 Acceptability, Responsibility, and Privacy

Participants also raised concerns about the ethical and data governance implications of deploying SARs and ALTs in care home settings. They questioned whether constant monitoring might feel intrusive or diminish residents' sense of privacy and autonomy. Participants worried about the potential for excessive data collection, unclear data-storage practices, and the possibility of data being shared beyond the intended care team. The accuracy of the systems' measurements and predictions was also highlighted as critical, as incorrect outputs could lead to inappropriate or even harmful interventions. Security vulnerabilities, software bugs, and technical flaws were seen as further risks, reinforcing the need for robust testing and transparent safeguards.

Participants emphasised uncertainty around accountability: specifically, who should be held responsible when SARs or ALTs make incorrect decisions or trigger unsuitable actions, and how liability would be distributed among care providers, developers, and technology suppliers. Participants as first response agreed that a general manager shall be held responsible. However, in further discussion, the participants suggested that decisions by SARs and ALTs shall be supervised by some human (keeping human-in-the-loop), with the medical professionals inclined towards systems where humans always need to authorise AI-driven decisions.

Notably, a large potion of the participants showed genuine interest on adopting SARs and ALTs in older adults care homes—especially, as some of them hypothetically placed themselves in the position of residents. However, a degree of skepticism remained, especially among the team of caregivers. They questioned whether such systems would truly improve delays and provide timely needed care. Moreover, many underscored the importance of human connection, and the impact of SARs and ALTs may have on this aspect.

5 Conclusion and Future Works

"Stop and Watch" is a well-established practice that helps caregivers recognise and escalate early signs of deterioration in individuals across healthcare settings. Although the practice offers substantial clinical value, it remains highly workload-intensive and vulnerable to missed or inconsistent observations. This paper contributes insights from a participatory workshop with key stakeholders, undertaken as part of our multidisciplinary effort to disentangle many interrelated factors that shape both the success and limitations of this practice. Our findings highlight the potential for SARs and ALTs to meaningfully support "Stop and Watch" activities, while also revealing the priorities and concerns of those who would ultimately use or be affected by such systems.

Our future work will focus on revising the current proof-of-concept system based on the insights gathered in this study, followed by pilot testing to refine the system's HRI functions, the associated monitoring dashboard, and the integration of the entire system within existing care workflows. A long-term HRI experiment will be investigated to evaluate feasibility, usability, and the real-world impact of the system on early detection practices, caregiver workload, resident well-being, and other relevant outcomes.

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