Open Issues in Designing VUIs to Support Older Adults Seeking Health Information

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Abstract

Voice user interfaces (VUIs) offer a comparatively easier and more accessible mode of interaction for older adults seeking information. Recent literature shows that out of all informational queries made to VUIs, health-related queries are the most popular among older adults. However, the current versions of commercially available VUIs are not designed or optimized for handling health information-seeking behaviors. In this position paper, we identify issues with current VUIs in presenting health information and discuss opportunities for future research to better support older adults in this behavior. Our arguments underscore the importance of designing VUIs that are tailored to the unique needs and capabilities of older adults to improve their health outcomes and overall quality of life.

Author Keywords

Voice User Interfaces; Conversational User Interfaces; Older adults; Health Information Seeking

CSS Concepts

Human-centered computing~Human computer interaction (HCI)~Interaction devices~Sound-based input

Introduction

Voice User Interfaces (VUIs), integrated into a variety of devices (e.g., phones, tablets, speakers, and even refrigerators), are becoming increasingly popular among older adults. In the U.S., one-fifth of older adults have a smart speaker in their homes [1]. These smart speakers are used for a wide category of purposes including setting alarms, playing games, asking for information, performing home automation tasks, and social companionship [2, 13]. Among these categories, information seeking is one of the more popular use cases of VUIs [2, 13].

Older adults, in particular, routinely ask their VUIs health-related questions [10, 12]. Pradhan et al. [12] conducted a 3-week longitudinal field study in the homes of seven older adults, where they discovered that health and medical information seeking was the most frequent usage scenario. Informational queries ranged from specific health conditions like sugar levels to daily health issues like toothaches. Similarly, Harrington et al. [9] conducted a 5-day diary study with 30 Black older adults from low-income environments and found that most participants regularly made inquiries regarding chronic illness management, such as diabetes, to their Google Home smart speakers. Despite current literature suggesting that seeking health information is a routine behavior among older adults who use VUIs, commercially available VUIs are not equipped to handle such queries. This is exemplified by a study conducted by Bickmore et al. [3] in which 54 participants used Alexa, Siri, and Google Assistant to search for health information. The researchers found that approximately 29.2% of health-related information task scenarios had the potential to cause harm to the user, while 16.1% of the scenarios could have led to fatal outcomes.

Our investigation of VUI literature pertaining to older adults has revealed a notable absence of involvement, trust, and sensitivity in their pursuit of health information. These issues necessitate attention to enable older adults to manage their health effectively by offering them precise health information expeditiously.

Involvement

Older adults are a highly heterogenous group in terms of age, education, physical status, cognitive development, or attitudes towards technology. Although recent literature has seen an increase in older adults' participation in the design and development of novel technologies, much work is still needed to better understand their perceptions and use of VUIs. Commercially available smart speakers are marketed toward older adults [15]. However, VUIs are not designed to prioritize the need of older adults. Older adults tend to anthropomorphize VUIs more than younger adults [5], and their mental model is strongly based on human-human interaction [4]. However, VUIs are hardly 'conversational' [8, 11], and the expectation of human-like conversations with them leads to conversational breakdowns. In conversations with VUIs, the error rate for older adults can be as high as 33.6% [10]. One of the reasons for this is older adults tend to be more verbose than younger adults and can take longer to respond [7]. However, VUIs do not take this context into account. This is exacerbated in scenarios of health information seeking. Brewer et al. [4], in interviews with 35 older adults, found query (re)formulation a major barrier in seeking complex health information. Further, VUIs currently do not provide

appropriate support to progress the conversation in the event of a breakdown.

There is a major need for developing older adult-specific design guidelines and heuristics by considering the heterogeneity of this user group. An attempt should be made to move away from the 'frailty narrative' [14] and consider a more individualized design to support older adults in various contexts, including health information seeking.

Trust

Regarding health information on VUIs, the credibility of the source is important. Currently, it is not possible to select and gauge the source of information, and user queries would retrieve the top result. This interaction minimizes user autonomy and presents ethical dilemmas [4]. Moreover, these results also need more nuance. For example, asking Google Assistant for the symptoms of a heart attack would give you a list of symptoms retrieved from the Mayo Clinic. However, symptoms of heart attack are drastically different for men and women. So, even if the Google Assistant is aware of the users' sex, it would not fetch relevant and personalized information. These situations create a lack of trust in VUIs. Conversely, an excess of trust could be even more dangerous as it could lead to automation bias. Users are more likely to reveal sensitive health-related information to VUIs that they perceive as more trustworthy [6]. Since older adults tend to interact with VUIs as social companions [12], they are likelier to build unwarranted trust with them. The projected humanness of VUIs is especially problematic in this scenario.

VUI researchers need to focus on developing design interventions to calibrate user trust. This can be done by improving the accuracy of the information provided to the user, giving more control to the users, and being radically transparent about the intelligence of VUIs.

Sensitivity

Health information is a sensitive topic. It needs to be delivered with empathy and consideration of the users' context. It is absurd to think that the tone and diction of a VUI repeating the content of a shopping list is the same as how it would relay the symptoms of Alzheimer's disease. A lot of it could feel like a robot reading Google searches [8]. Moreover, the context of the user is important as well. Delivering medication instructions and reminders to older adults is a popular use-case of VUIs. But consider a scenario where an older adult is hosting a guest. A VUI listlessly reminding the older adult to take a particular medicine could be a source of unwanted distress. The current generation of VUIs is not context-aware enough to handle these situations and making them aware would result in major privacy compromises.

We find existing research in 'sociophoentics' [16] to be inspirational in this regard, and we urge researchers to consider health information seeking as an important design scenario.

Conclusion

The utilization of Voice User Interfaces (VUIs) as a means of obtaining health information among older adults has been documented. Nevertheless, a thorough review of the VUI literature pertaining to this demographic indicates that issues such as involvement, trust, and sensitivity pose significant obstacles to this

rising need. As such, we strongly recommend that researchers focus on developing design guidelines that cater to the unique needs of older adults, providing access to accurate, credible, personalized, and further context-aware health information through VUIs in a humane and user-friendly manner.

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