Extending Smart Home Technology Design with Gender Aspects

Nana Kesewaa Dankwa
Electrical Engineering and Computer Science
University of Kassel
Kassel, Germany
nkdankwa@uni-kassel.de

ABSTRACT

The integration of gender into research will present other dimensions to technological innovation. It will address false assumptions of technological needs based on gender stereotypes and most importantly address user needs that arise from gender and sex variances. The design of smart home technology has often looked at the home as bland and sterile and avoided the complexity of relationships arising from the home. The use of Participatory Design methods is deemed as advancing user interests and enabling the collaborative design of technology, especially with marginalised groups. Additionally, technology design is approached from the user perspective. This paper presents the role of gender in technological innovation and smart home design and presents a preliminary study with 6 elderly women. The findings for the study present insights for consideration for future participatory sessions.

CCS CONCEPTS

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

KEYWORDS

Gender, Participatory Design, Innovation; Smart Homes,

1 Introduction

The third strategic approach to gender equality "Fix the Knowledge"[1] stimulates excellence in science and technology by integrating sex and gender analysis into research [11]. This enables new discoveries of valuable dimensions to innovation and research. In this paper, I present the essence of considering gender as a driver of technological innovation, explain the role of gender in smart home design and present a preliminary study with 6 elderly women who live alone. This paper presents the activities done to establish an initial researcher-participant relationship and understand the values of the elderly females paving the way for future interactions.

[1]The other two strategic approaches to gender equality by governments and universities are "Fix the Numbers of Women" and "Fix the Institutions".

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2 Gender in Technological Innovation

The integration of sex and gender analysis into research and innovation extends beyond the collection of statistical data on gender and as project add-ons. It allows researchers to query gender norms and stereotypes, reconsider standards and reference models leading to an in-depth understanding of gender-associated needs, behaviours and attitudes. It enhances the societal relevance of the knowledge, technologies and innovations produced and contributes to the production of goods and services better suited to potential markets [11]. Thus potential gender differences that exist are acknowledged and there is accommodation for these in innovation. For example, in game development, most games are marketed and sold to men ignoring other genders as potential markets [11]. Integrating gender into game development research would consider all gender game interests, with design and development carried out with such interests at heart. Another example of integrating gender into research is the Pregnancy Crash Test Dummies which allows for the testing of car seat belts with 'pregnant-looking' crash test dummies to avoid foetal deaths, which is most rampant with conventional seat belts [11]. Gender driven technological innovation addresses biases, stereotypes, oppression and the digital divide. This means collaboratively working with diverse users to innovate technology and integrate gender aspects in technology.

3 The Role of Gender in Smart Home Design

In Germany, there has been a 20-30% increase in user interests in smart home devices since 2015[3]. Though there is an increased user interest they are inherent holdbacks preventing the realization of the smart home concept on a mass-scale basis [5]. This is often due to research ignoring the concept of the household as a complexity of relationships and rather advancing the concept of smart homes as a sterile place, neutral and bland [10]. Designers and researchers need to consider the existence of alternative households and avoid the one size fits all approach to smart home technology [4]. The design and development of smart homes should trigger, and answer questions of how smart home

technologies should merge seamlessly in current definitions of households. It is necessary that research looks at the ever-changing notions of family and households to boost mass-scale user adoption. The home remains one of the most gendered spheres of society in most cultures [12] with most of what people do within a household being culturally determined by gender [8]. And in western countries, there is a significant gender division within the modern family home with women still taking on the higher percentage and spending much more time on household chores as compared to men [8, 2]. For example, Tjørring et al. in their study on saving electricity in the home believe the correct strategy is to address the woman in the household as she is normally solely or partially responsible for using the relevant energy-consuming appliances [12] and gender aspects in smart home innovation may be the answer to untapping the potentials of energy efficiency from smart homes[1]. Smart home technological innovation should focus on what is happening now in the home, who is in the home, who does what in the home and how these users' needs can be addressed. The consideration of the gender aspects in smart home research allows a new outlook on the different preferences and needs of gender in a home. The home has different connotations to each gender-construct and thus a consideration of potential (e.g. behavioural) sex-gender differences in innovation avoids the delivery of stereotype-driven products.

The research project INTeGER is designed to develop along the lines of innovation in computer science and its gendered aspects and gendered methodologies in computing [6]. The project seeks to understand the process and how innovation in computing is defined and how this idea and process is affected by gender. Additionally, the project looks at the methods and methodologies that are most prominent in computer sciences and how they interlink with intersectional notions of gender.

In understanding the process of innovation, the project's research strategy is to work with user groups identified based on gender aspects to investigate the process of innovation using Participatory Design. One of such identified user groups are elderly women (65 years and above) living alone. Owing to the gender gap in life expectancy, elderly women spend a greater part of their elderly lives alone. Additionally, in the EU elderly women represent the largest proportion of women living alone [7]. Elderly women living alone are more likely to suffer from poverty, illness and disability [7]. There is the need for research emphasis on this user group as they may face challenges with technological innovations designed with young adults in mind, have financial constraints in purchasing smart home technology and have different sets of needs as compared to a typical often marketed notion of a smart home consumers which is a middle-class white family often with one or two children[5].

4 Case: Elderly Females Living Alone

4.1 About the study group

The user group consisted of 6 elderly women between 77-84 years old who lived in the Harleshausen suburb of Kassel. The contact to the women was through my 83-year-old female neighbour who was part of a "Volkshochschule" (a German adult education centre) book reading course and a "Spielkreis" (gaming group). They had been told that the study was related to gender and technology.

4.2 Introduction and Purpose

In an introduction exercise, selected photos of women from all over the world from the photographer Mihaela Noroc[9] were displayed and each participant had to take a photo, guess which part of the world the woman in the photo was from and tell us what they knew about this country and introduce themselves. We then talked about the purpose of the gathering where I introduced to them the concepts and importance of gender and sex in research and especially in technological research. On to the topic of smart homes, participants also had to pick up selected images of smart home devices I had prepared and tell us if they had an idea of the purpose of the device. While most women were not familiar with the term "smart home" they knew the concept and what the possibilities were. The discussions centred on how practical such devices were and would be in their lives and if they needed such things at their age.

4.3 Five Things-Five People

In the next activity I named the Five Things-Five People activity, the elderly women were given printed out sheets that required them to fill in the blank spaces with 5 things they needed during their daily activities and 5 people they often interacted with or are an important part of their life within 10 minutes. This exercise was structured to enable the women dive into their private lives and help me understand the significant artefacts and persons in their current lives. This was to help me understand the women's needs based on their values. After this activity, each woman read out what they had written to the group and we talked about these "Things and People" and asked questions where relevant.

4.4 In a World where all is possible

The next activity was a speculative activity for imagining possible experiences beyond what was possible today. In this activity, the women discussed some of the challenges they face with technology use and what they could do if they overcame the challenges.

5 Findings

Though this first meeting was mainly to gain trust, get to know the women, find out their interests and set the basis for future work, it brought out other insights valuable to my research. The insights were the role of finances, confidence and know-how in getting technology, the fear of trying new technology (while some women were quite open to trying new technology others felt it was not necessary in their current age) , all but one woman had children, however they valued the contact to other elderly women and neighbours as most children and grandchildren lived far away. Additionally, most women believed that compared to other

women of the world they had no problems to complain about and should remain grateful for what they currently had. The meeting was insightful for me as well in understanding the roles German women in their generation had played for their families and their country.

6 Way Forward

This research work will continue to look out for participatory ways of engaging single elderly women in designing smart home technology that meets their needs, making them with them with their needs at the core of it all. Future participatory sessions and studies will cover more in-depth studies using one-to-one interviews and co-design sessions to understand the artefacts that are valuable to the elderly females and explore creative ways of smart home design based on their values.

7 Conclusion

In this paper, I have sought to emphasize the key role of gender in technological and smart home innovation. I have presented a preliminary study with 6 elderly women who live alone and presented the activities carried out with them. I have presented some insights gained during this preliminary study and ways for possible future collaborations with the women.

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