Smart Homes for elderly to promote their health and wellbeing

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ABSTRACT

The percentage of UK society aged 65 or above is projected to increase to 20.7% by 2027[1]. This increases health challenges, including various physical and mental health concerns which creates a demand for health care services and technologies [2]. This increases costs and exerts pressure on the national health services as well as private health care providers. There is a need for smart home systems which would preserve independence without compromising on their safety and promote their quality of life. Despite the development and availability of several assistive technologies tailored to support the elderly population, the rate of adoption is still low [3,4]. Current research in this area is lab-based and does not account for real-world variability in human activities and behavior [7], also social isolation problems are generally ignored. We aim to model and design an unobtrusive intelligent environment solution which boosts the rate of adoption among the elderly population in order to promote their health and wellbeing.

KEYWORDS

Ethics, Acceptability, Smart Home, Ambient Living, Elderly, Machine Learning, Health, Well-being

1 Introduction

In the UK during mid-2017, the population for the age group 65 and above was 18.2% which is estimated to grow to 20.7% by 2027 [1, 2]. This rise in aging population increases physical and mental health challenges giving rise to health care services [2]. The percentage of people with dementia is forecasted to increase by 40% over the period of 12 years and 56% over 38 years. This increase highly effects the cost of health services. In the UK, dementia costs 26.3 billion GBP averaging at 32,250 GBP per person with dementia including health and social care (public and private funded) [6].

In order to reduce this pressure, assistive technologies are being researched and developed for elderly people to enable them to lead their lives independently without comprising on their health and safety. It enables families and care takers to benefit from advanced technologies with affordable options to monitor, care and provide safety to their loved ones remotely. In other words, the purpose of these technologies is to assist the elderly people in their daily lives to achieve QoL (quality of life). QoL is characterized by various factors such as social contacts, activities, health and family [5].

1.1 Aims and Objectives

Smart home technologies may be able to help the elderly achieve the desired QoL. Smart homes may consist of one or several assistive technologies to provide various benefits to the elderly community such as (1) self-management, (2) activity monitoring, (3) health monitoring, (4) emergency monitoring, (5) social connectivity and (6) daily task automation.

We will design a real time unobtrusive smart home solution which requires: the use of appropriate sensing technologies, identification of activities of daily life (ADL), data pre-processing techniques and machine learning algorithms [8]. This is challenging due to the dynamic nature of requirements such as: (1) personalized individual needs, (2) identifying ADL in various settings within a home, (3) applying the same model with minimal changes to a different architecture of a home and (4) identifying complex ADL where individuals are collaborating in an activity. The objective is not only to consider their physiological needs but also provide a platform where the elderly people can be socially active by involving their favorite activity. For example, using TV to create a virtual environment for socializing.

We have found that elderly people are more likely to adopt assistive systems when: (1) It is more personalized towards their needs, (2) Protects their dignity and independence, (3) Provides control over technology, (4) Not isolating and (5) Encompasses the user needs to increase the perceived benefit. Therefore, we plan to design a system that caters for, these points so that it is also acceptable and adoptable by the elderly community.

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