Chapter 6
Better Future for Home–Cared Elderly Patients:
A Prototype of Smart Clothing

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ABSTRACT

The need for innovative technologies that monitor and assist the independent living of elderly people in their homes is growing. The socio-economic benefits by utilizing such solutions are shared between many parties including the elderly people, support services and caregivers, and the medical system. This chapter proposes a wearable smart clothing-based monitoring system for home cared elderly patients. The development of the prototype smart cloth, which currently senses and alerts about body temperature, is discussed in this chapter. The proposed system is expected to provide a more dignified life for the elderly home cared patients by maintaining their independence and privacy while saving public and private money.

INTRODUCTION

With the exponential growth of ubiquitous and pervasive computing, mobile health (mHealth) applications for healthcare are emerging with the objective of delivering better healthcare and/or wellness. One key consumer group for such systems is elderly patients. Providing home monitoring, assistive and other support services for elderly people living in their own home reduces the need for hospitalisation and the cost of care. At the same time, such solutions improve patients' quality of life (Norris, Stockdale, & Sharma, 2009), because many older people wish to remain as independent as possible in their own home for as long as possible (Magnusson, Hanson, & Borg, 2004).

Magnusson et al. (2004) classify mHealth systems as providing information and services for older people at home, for family carers, both older people and family carers, and for all. They further argue that the barriers to adoption of these systems, such as the elderly having low affinity for computing systems,

and few elderly people having access to a computer (Irvine, 2003), could be overcome by appropriate training to enable older people to adopt new technology in their daily lives.

Scholars and practitioners alike predict that mHealth will be one, if not the key, driver for future healthcare initiatives (Gov2020, 2019). Despite smartphones having been pervasive for more than a decade, adoption of mHealth applications by elderly consumers is still in its infancy. Edirisinghe, Stranieri and Wickramasinghe (2017) argue that the adoption of mHealth applications has been hindered by three main factors: (i) device-specific, external server, or storage-related technology limitations; (ii) inability to meet user requirements, expectations and goals; and (iii) security concerns. A number of studies which have investigated the consumer group of elderly people claim that older adults (over 50 years old) remain reluctant to adopt smartphones (Pheeraphuttharangkoon et al., 2014; Mohadisdudis & Ali, 2014). Years later, elderly consumers continue to show reluctance to use smartphone services (Berenguer et al., 2017). Barriers to the adoption of smartphones and associated services by the elderly include financial limitations, vision impairments, and lack of interest or know-how (Mohadisdudis & Ali, 2014). Supportively, Nikou (2015) argues that sociological and psychological factors, in addition to aging-related characteristics, better explain the dynamics of mobile technology adoption by the young-elderly. According to Berenguer et al. (2017), physical and cognitive decline among seniors remained a persistent barrier to adoption. Further, Berenguer et al. (2017) argue that seniors do not adopt popular services simply because they are not designed for seniors; they are neither designed to cater to the life-style changes seniors experience, nor are they associated with seniors' needs and interests. A study in the US found that 90 per cent of elderly people prefer to 'age in place' (Bozan & Berger, 2019). Such unique preferences, characteristics and requirements from a consumer group place a significant strain on researchers and healthcare technologies to provide better support for elderly people to be cared for at home.

This chapter presents a monitoring system based on smart clothing that supports elderly home-cared patients as an answer to the following research question: how can technology solutions be developed to provide better support for home-cared elderly patients? The chapter also discusses the development of the smart clothing prototype.

The background section discusses various monitoring systems proposed for elderly people in the literature. Studies done since 2004 on home monitoring systems, assistive technologies and wearable clothing are discussed in this section. The home care monitoring system we propose is discussed next. The development of the smart clothing prototype is then presented, followed by our conclusions.

BACKGROUND

A tremendous number of mHealth systems were proposed for home cared elderly in the literature. Recently, Bozan and Berger (2019) presented a survey of ambient assisted living technologies for the elderly. This review classifies the literature based on the advancement of the technology (first, second and third generation) on the basis of each system's detection, responsiveness and prevention ability. An extensive review of the literature since 2004 revealed that classification of systems based on these pillars only considers the technology point of view. We believe, however, that more practical aspects, such as user-friendliness and ease of use, are more relevant to the specific consumer group, who are not technology-savvy, and amongst whom the adoption of smartphones and associated services is slow (Pheeraphuttharangkoon et al., 2014; Mohadisdudis & Ali, 2014; Berenguer et al., 2017).

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