Chapter 14
Assistive Technologies for People with Dementia

Christos N. Xenakidis
G.M EuroCy Innovations Ltd, Cyprus

Antonis M. Hadjiantonis
G.M EuroCy Innovations Ltd, Cyprus

George M. Milis
G.M EuroCy Innovations Ltd, Cyprus

ABSTRACT
This chapter focuses on the presentation and discussion of available assistive tools for people with dementia symptoms and cognitive decline, leading to the conclusion that these tools may, nowadays, will be replaced by mobile applications for smart devices. A functional mobile prototype assistive application for android platform devices like smartphones, tablets and smartwatches is presented, with features that offer support to the basic needs of caregivers and people with cognitive decline, giving more emphasis on people with early Alzheimer’s disease symptoms. It is shown that, utilising the available technology, as well as existing literature and empirical knowledge, mobile applications may offer a serious alternative to currently available assistive tools, while also offering considerable functionality advantages.

INTRODUCTION
The aim of this chapter is to identify new ways in which existing knowledge from the fields of medicine, nursing, psychology, cognitive science and computer science can be combined and used for the support of people with dementia symptoms and cognitive decline. The chapter overviews the basic needs of persons with cognitive decline, highlights currently available technological support and elaborates on these needs with specifications for mobile assistive applications for smart devices. Evidently, there are many technology tools currently being used by persons with dementia, to support their basic needs. Few indicative tools are described in the following, with the perspective to later discuss the transfer of their functionality to modern smartphone devices. Innovative and simple mobile applications that can be created and used to support the basic needs of persons with dementia are proposed, along with new smartphone user interfaces, to enable the easy interaction with end-users.

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BACKGROUND

Challenges for People with Dementia

The weakening of the mnemonic functions is perhaps the most basic and most common challenge for people with dementia. Therefore, they are in need of external memory enhancers and reminding tools to retain daily responsibilities, methods of self-service, even the basic elements of their identity (Dey & Abowd, 2000). Furthermore, the decline of visual-spatial skills of people with dementia necessitates the creation of methods and tools to support the individual to orient in space, to assess the visual distances and respond to simple everyday needs that are associated with time (taking a drug) (Lauriks, et al., 2007).

The mnemonic eclipses experienced by people with dementia, sometimes temporary and sometimes permanent, generate many problems in their social life, as difficulty to go for a walk alone because of the risk to be lost and not remember the address of residence or name (Dey & Abowd, 2000). Therefore, these people move usually accompanied by carers or nurses, a fact that deprives them of any autonomy. Consequently, tools and applications become necessary, that drive the person to quickly find information relating first of all to his/her identity and residence (Lauriks, et al., 2007).

A challenge that arises is “Could the few available tools, mostly improvised, be used to actually support the person in need rather than stigmatise him/her?” For instance, a coat on the assisted person’s back indicating his/her identity and contact details with family, may offer access to direct care if the person is lost, but at the same time it might prevent him/her from undertaking activities such as a short walk, as often the person will feel exposed and humiliated (Hawkey, Inkpen, Rockwood, McAllister, & Slonim, 2005) So, it is important to understand that creating supportive applications and tools presupposes respect for the person’s dignity, personality and protection of personal health data. (McWalter, Toner, McWalter, Eastwood, Marshall, & Turvey, 1998).

Context-Aware Applications

As modern science has failed to cure dementia, the assistive application engineers attempt to design and develop assistive applications focusing on the early management of the apparent effects of the disease, taking into account the context of each situation. However, it is not clear what can be described as a “context” in the case of the person suffering by dementia. This actually involves many challenges that the design of the application needs to consider, such as the space-time context, the physical condition of the person, the emotional state, the conditions under which they may run the application, environmental (weather conditions), the activities to be achieved, etc.

For instance, as also mentioned previously, dementia affects the sense of time. Thus, a class of assistive applications focused on facilitating the recovery of the individual’s relationship to time through reminder functions (Dey & Abowd, 2000). Another source of difficulties is associated with visuo-spatial orientation, therefore a large part of the applications deals with the safe navigation of the person in the field, and provides space-time mapping information.

Furthermore, the tendency of the persons with dementia to get lost outdoors because of the failure of memory and weaknesses in orientation, is a common fear of both them and their families. Thus, another group of applications are called to solve this exact challenge with the manufacturing of “transmitters” through which the caregivers of assisted persons may know in real time their location.

Going one step further, the persons with dementia find it very painful trying to remember how to use, e.g. the phone or the toilet at home, and this is depriving their self-confidence, sociability, and...