

## Chapter 6

# Emerging Technologies for Dementia Patient Monitoring

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### ABSTRACT

*In this chapter, the author explores the available technologies that can enhance the Quality of Life of individuals with dementia. He investigates the foundations of telemetry, different sensor technologies, Context-Aware Systems, and the use of the Internet of Thing in supporting those to live an independent life. The author reviews the use of Smart Homes in supporting individuals with dementia. He then discusses the role of social networking sites in keeping this group connected. In addition to that, the author examines the use of Global Positioning System (GPS) technology in management of wandering behaviour and the possible use of the currently available technologies in the detection, diagnosing the cause, assessing the response to treatment, as well as prevention of Behavioural and Psychological Symptoms in Dementia (BPSD). This is followed by a brief discussion of the acceptability and the ethical issues that surround the use of these technologies.*

### INTRODUCTION

We live at a unique juncture of human history, with an aging population and a rapid spread of technology. This is a result of a growing body of scientific knowledge that has helped in increasing the average life span of citizens and the development of new technology. With more technology, there is a tendency for increasing prosperity, which in turn encourages states to invest more in science and its applications (Charness, 2003).

However, this increase in the elderly population comes with its own challenge, whether social, political, cultural, economic or health-related. The scope of such challenges has never been faced before in human history. Hence, it would be fairly reasonable to assume that such challenges need novel solutions.

Longevity comes with its drawbacks. One of these drawbacks is the increased risk of dementia. That in turn, incurs a huge burden on the economy. For example, in 2012 the financial cost of dementia in the UK was £23 billion a year. This cost will grow to £27 billion by 2018 (Lakey, Chandaria, Quince,

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Kane, & Saunders, 2012). More than a 25% of that cost is the cost of unpaid care. The financial burden of dementia on the UK economy is more than what cancer and heart disease cost combined (Luengo-Fernandez, Leal, & Gray, 2010). In the whole of Europe, the total direct cost of dementia in 2010 was estimated to be above €105 billion per year, of which €88 billion is spent on care (Olesen, Gustavsson, Svensson, Wittchen, & Jönsson, 2012). Meanwhile in the USA, it was estimated that dementia would cost the economy \$214 billion in 2014. That is in addition to 17.7 billion hours of unpaid care that is valued at more than \$220 billion (Alzheimer's Association, 2014).

Though technology cannot be the solution to all the challenges dementia care faces, The Law of Accelerating Returns suggests that the exponential growth of technology will result in more effective and efficient ways that would increase productivity. That is then expected to change all aspects of individuals' lives in a more effective, efficient and personalised way, including how health and social care are conducted. This should then promote autonomy, independence, and safety and would enhance the quality of life of individuals with dementia (Fahy, West, Coles, & Harris, 2010; Peterson, Prasad, & Prasad, 2012)

## **CHAPTER ORGANISATION**

This chapter will explore a number of subjects related to the use of emerging technologies in the care of individuals suffering with dementia. First, we will define the challenges associated with dementia that new technologies can help solving. Then, a review of literature will follow, studying the possible uses of ambulatory monitoring and telemetry. The use of big data combined with ubiquitous computing will be examined revealing how these can improve the quality of life for those who suffer with dementia. We will also discuss the concept of Internet of Things as a foundation for Smart Homes. We will then explore the role of Social Network Sites in keeping patients in contact with their loved ones.

Wandering is a common problem in dementia; therefore possible solutions like Global Positioning System (GPS) and non-GPS technologies will be examined and assessed in this chapter. The role of other currently available technologies will also be reviewed and how they can prevent and manage Behavioural and Psychological Symptoms of Dementia (BPSD). The chapter will end by discussing the attitude towards these new technologies and the ethical foundations that may have a role to play in the use of new technology in dementia.

## **PROBLEM UNDER STUDY**

Dementia is a chronic progressive disease that affects an individual's ability to live independently. Hence, it is not surprising that it is the strongest predictor of living in institutional care (Andel, Hyer, & Slack, 2007). With no cure in the near future, the main focus for services is to keep patients in a safe environment while maintaining their freedom, ideally in their own home. Another focus is managing challenging behaviours that could happen at different stages of dementia. Though psychological and medical interventions like acetyl- cholinesterase inhibitors play a significant role in managing dementia, there is still a lack of effective solutions that enable individuals to live a fairly safe, independent and autonomous life while having a condition like dementia.

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