Chapter 14
The Essence of Smart Homes:
Application of Intelligent Technologies towards Smarter Urban Future

Amirhosein Ghaffarianhoseini
University of Malaya (UM), Malaysia

Hossein Omrany
Universiti Teknologi Malaysia (UTM), Malaysia

Ali Ghaffarianhoseini
Auckland University of Technology, New Zealand

Anthony Fleury
Ecole des Mines de Douai, France

John Tookey
Auckland University of Technology, New Zealand

Nicola Naismith
Auckland University of Technology, New Zealand

Mahdiar Ghaffarianhoseini
University of Calgary, Canada

ABSTRACT

Smart homes have been predominantly pointed as one of the key constituents of intelligent environments. These are residential units substantially integrated with a communicating network of sensors and intelligent systems based on the application of new design initiatives and creative technologies. This study provides a holistic overview on the essence of smart homes besides demonstrating their current status, benefits and future directions. The study reveals that smart homes embrace significant potentials towards achieving comfort, security, independent lifestyle and enhanced quality of life. Findings urge the necessity to focus on further exploration of the social and environmental benefits derived from the application of creative technologies in smart homes. The study concludes that smart homes play a fundamental role in shaping the future cities. Finally, the study identifies a research gap indicating that there has been less consideration towards linking the fundamental potentials of smart homes to the overall performance and key indicators of smart cities.

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1.0 INTRODUCTION

Smart homes embrace the concept of integrating intelligent technologies into residential spaces. Their primary aim is to increase the quality of users' life through the application of automated systems. Smart homes also facilitate constant monitoring and controlling for the patients by detecting the residents' behavioral patterns and activities through the embodied sensors and actuators installed throughout the unit. Smart homes offer the potential for enhanced safety, comfort, productivity, efficiency, and well-being. Smart homes are a promising solution for the building sector facing major environmental challenges namely, increased level of energy consumption, environmental pollution and urban heat island (UHI) impacts. The notion of smart homes has been gradually expanded to embrace the environmental, social and economic dimensions of sustainability. In fact, the continuous usage of fossil fuels has meant that tackling the environmental threats, related to the climate change and global warming is highly crucial in built environment practices. As a result, the energy-oriented intelligent features and versatile sustainability indicators are fundamental issues in defining the future of smart homes.

This chapter provides a holistic overview of the notion of smart homes while addressing their key features, benefits, current and future challenges. It develops a systematic review of the existing literature on smart homes and investigates the current status of implementing smart homes. It also discusses the potential impacts of smart homes on the circumstances of achieving sustainable urban future as a constituent of future smart cities. It concludes by exploring the effectiveness of using creative technologies in smart homes as a promising resolution to enhance the built environment practices.

2.0 THE NOTION OF SMART HOMES

This section outlines the historical context of smart homes and explains the technological advances that have paved the way for smart homes to exist. It also offers an insight into the range of current definitions available for smart homes and examines how the concept of smart homes has developed confirming that it is not only about integrating emerging technologies but aims to improve the level of convenience, social well-being, productivity and sustainability for its users and society.

2.1 History of Smart Homes

Technological advancements of the building construction sector in the 21st century have been beyond people's anticipation (Aldrich, 2003). Emergence of electricity into residential spaces during the previous century acted as a facilitator for this change. This provided a new source of clean and convenient power for appliances and enabled the industry to introduce various novel home products. The advancement of IT/ICT also acted as a key player empowering such changes, it enabled information exchange among people, appliances, systems and networks (Aldrich, 2013). A historical timeline demonstrates the context for the emergence of smart homes.

- **1915-20:** As a result of manpower shortage, employment of electrical home appliances originated with the introduction of vacuum cleaners, food processors and sewing machines. It was suggested that, employing these machines would enable one person to perform all the household's tasks with adequate time for leisure.

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