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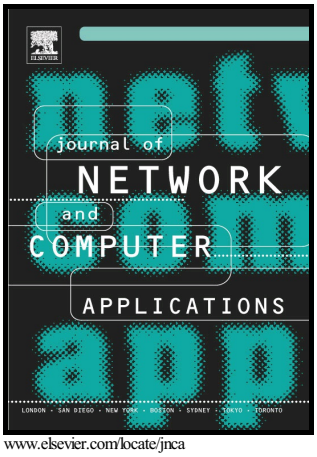

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A Review of Smart Home Applications based on Internet of Things

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Abstract
The new and disruptive technology of smart home applications (hereafter referred to as apps) based on Internet of Things (IoT) is largely limited and scattered. To provide valuable insights into technological environments and support researchers, we must understand the available options and gaps in this line of research. Thus, in this study, a review is conducted to map the research landscape into a coherent taxonomy. We conduct a focused search for every article related to (1) smart homes, (2) apps, and (3) IoT in three major databases, namely, Web of Science, ScienceDirect, and IEEE Explore. These databases contain literature focusing on smart home apps using IoT. The final dataset resulting from the classification scheme includes 229 articles divided into four classes. The first class comprises review and survey articles related to smart home IoT applications. The second class includes papers on IoT applications and their use in smart home technology. The third class contains proposals of frameworks to develop and operate applications. The final class includes studies with actual attempts to develop smart home IoT applications. We then identify the basic characteristics of this emerging field in the following aspects: motivation of using IoT in smart home applications, open challenges hindering utilization, and recommendations to improve the acceptance and use of smart home applications in literature.

Keywords: Smart home application, Remote home, Intelligent home, Home automation system, Automated home, Internet of Things (IoT)

1 Introduction

As an important component of the Internet of Things (IoT), smart homes serve users effectively by communicating with various digital devices based on IoT. In the ideal version of a wired future, all devices in smart homes communicate with one another seamlessly. Smart home technology based on IoT has changed human life by providing connectivity to everyone regardless of time and place [1], [2]. Home automation systems have become increasingly sophisticated in recent years. These systems provide infrastructure and methods to exchange all types of appliance information and services [3]. A smart home is a domain of IoT, which is the network of physical devices that provide electronic, sensor, software, and network connectivity inside a home.

Smart homes are automated buildings with installed detection and control devices, such as air conditioning and heating, ventilation, lighting, hardware, and security systems. These modern systems, which include switches and sensors that communicate with a central axis, are sometimes called “gateways.” These “gateways” are control systems with a user interface that interacts with a tablet, mobile phone, or computer; the network connectivity of these systems is managed by IoT [4].

Since 2010, researchers have analyzed IoT-based smart home applications using several approaches. Regardless of their category, existing research articles focus on the challenges that hinder the full utilization of smart home IoT applications and provide recommendations to mitigate these problems. Research on smart home applications is dynamic and diverse. This survey aims to provide valuable insights into technological environments and support researchers by understanding the available options and gaps in this line of research. It aims to shed light on the efforts of researchers in response to new and disruptive technology, map the research landscape into a coherent taxonomy, and determine the features that characterize this emerging line of research in smart home technology. This paper is organized as follows. In Section 1, IoT and its applications in smart homes are introduced. In Section 2, the research methods, scope, literature sources, and steps in filtering research articles are described. The research landscape based on literature is also mapped into a coherent taxonomy. In Section 3, the results and statistical information of the final set of articles in this study are reviewed. In Section 4, the benefits and challenges extracted