

# Internet-of-Things technologies for Assisted Living

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An ambient assisted living (AAL) environment is an integration of stand-alone assistive technologies, solutions, and services. AAL (or simply assisted living) solutions can provide a positive influence on the health and quality of life of people, especially older people.

Keywords: Internet-of-Things ; Assisted Living ; Assisted technologies

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## 1. Introduction

The rise of the popularity of the internet of things (IoT) throughout the world has been steadily increasing in recent years. The IoT is regarded not only for its state-of-the-art approach to research but also for its practicality in many domains, illustrating high demand and applicability in multiple fields. This is because the IoT has radically changed the business processes in many sectors, where one key mechanism has been the convergence of traditional information and communication technologies (ICT), linked with real-time processing opportunities provided by Big Data and IoT. One of the most significant investments, which have been focused upon is more of a modern, evolutionary approach to IoT, which in this case, refers to the establishment and growth of future IoT ecosystems <sup>[1]</sup>.

A widely used definition of the IoT provided by Gigli and Koo <sup>[2]</sup> is “the current tendency for unifying all the resources in our world under a common infrastructure”. This common infrastructure provided by the IoT evidently provides many potential benefits for businesses, individuals, and scientific researchers. The IoT technologies are considered as enablers of the next industrial revolution <sup>[3]</sup> and future healthcare <sup>[4]</sup>. IoT relies not only on strong infrastructure but also on its design principles as a driving force in innovation and lesser constrained boundary conditions for creating the IoT ecosystems. Neither estimate can deny the value of IoT working in the industry in a multi-platform role and its potential in increasing global economic growth. These trends are best illustrated with the Gartner hype cycle for emerging technologies <sup>[5]</sup>. This famous emerging technology prediction gives a clear indication of the importance and the innovation potential of different IoT technologies.

Cognitive computing refers to smart systems that naturally interact with humans and other smart systems <sup>[6]</sup>. The essential technologies supporting smart system functionality are IoT for networking, artificial intelligence (AI) for data analytics, and cloud computing for data services <sup>[7]</sup>. Here AI refers to methods that enable the performance of tasks, which otherwise would require the use of human intelligence, such as decision-making. IoT specifically focuses on the technologies that bridge the physical world (“things”), digital technologies, and the social world (social behavior, etc.), based on computer vision, speech and natural language processing for natural human-computer interaction, smart allocation of resources, and intelligent provision of services <sup>[8]</sup>. The IoT technologies for AAL are technologies that focus on improving wellbeing and increasing the quality of life of its users. Currently, the IoT platforms, as well as research on connected smart homes and cognitive computing are in the phase of the peak of inflated expectations. These trends show that there is a tremendous potential for innovation and growth where IoT technologies are concerned, which is in full alignment with the actual worldwide trends both within the research community as well as within industrial settings, thus providing great potential for the assisted living and healthy aging solutions as well.

## 2. Applications

The IoT technologies used for AAL can address major care problems amongst the elderly population <sup>[9]</sup> such as (1) limitations in activities of daily living, (2) risk of fall, (3) chronic diseases, (4) dementia, (5) depressive disorders, (6) social divide, (7) poor medication management, and (8) poor state of well-being. The needs of older people can be solved by adopting the appropriate IoT technological solutions <sup>[10]</sup> and global services specifically targeting older people <sup>[11]</sup>, such as location-based services to support freedom of movement and greater independence <sup>[12]</sup>.

Modern assistive technologies (or gerontechnologies <sup>[13]</sup>, in case of assistive technologies used for improving the well-being of older people) constitute a wide range of technological solutions aimed at improving the well-being of older people <sup>[14]</sup>. These technologies are used for personalized medicine, smart health, health tracking, telehealth, health-as-a-service (HaaS) <sup>[15]</sup>, smart drugs, and multiple other applications.

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