



# Special issue on advancements in ambient assisted living: integrating technology and human-centered design for enhancing user well-being and care

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The remarkable advancements in new technologies over the last decade, coupled with a substantial reduction in costs, have significantly propelled the development of more adaptable and personalized technological solutions tailored to meet and support diverse user needs. This progress has notably influenced the evolution of Ambient and Assisted Living (AAL) technologies, which are designed to enhance health, psychological and physical well-being, and support the autonomy of individuals with varying needs. Consequently, AAL technologies have been acknowledged as pivotal enablers for enhancing the quality of life in our present and future societies. They address the challenges posed by demographic shifts, support individuals in maintaining productive and healthy work lives, ensure that people remain healthy, independent, and connected within their homes, and enhance care delivery precisely where and when it is required. The scope of AAL is both broad and profoundly impactful, integrating smart environments and assistive technologies into the daily life of people with different needs in order to promote their autonomy, safety, and social interaction. The core of these advancements lies not just in their technological prowess but in their commitment to human-centered design principles. This alignment ensures that AAL technologies are not merely functional but resonate deeply with the special needs, preferences and contexts

of those they intend to serve, embodying a form of care that is both effective and efficient.

This special issue aims to highlight the most innovative research and developments in the field of AAL that, through a human-centered approach, are increasingly able to prioritize real user needs through smart, intuitive, and inclusive technologies. We have encouraged researchers, practitioners, and innovators from across disciplines to contribute original research articles, case studies, review articles, and innovative project reports that encapsulate the multifaceted aspects of AAL. Submissions had to highlight new approaches, methodologies, and technologies that seamlessly blend with human-centered design principles to address the diverse needs of users, especially the elderly and those with disabilities, to foster independent living, enhance psycho-physical well-being, and provide tailored healthcare solutions.

The agenda of papers published in this special issue includes a number of innovative topics. A prominent theme is the exploration of technological innovations aimed at improving health monitoring, particularly through non-invasive methods for tracking physiological parameters like heart rate and respiratory rate during sleep. This shows the potential of such technologies in early detection and intervention for conditions such as sleep apnea, highlighting the importance of technology in fostering independent living for the elderly and individuals with health conditions. Parallely, the significance of user experience and human-centered design in the development of AAL solutions is thoroughly explored. Research underscores the necessity of designing AAL products that are not only advanced in terms of technology but are also deeply embedded with user comfort, usability, acceptability, and emotional well-being. This approach ensures that the innovations are genuinely responsive to the users' needs and preferences, seamlessly integrating into their daily lives. The published papers also delve into the broader applications of AAL technologies in

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addressing the challenges posed by demographic changes and healthcare. These research papers discuss how AAL can support healthy and productive work lives, maintain independence and integration at home, and improve care delivery models. This sheds light on the role of AAL technologies as enablers in enhancing quality of life amid societal changes, highlighting endorsements from authoritative entities like the European Commission on AAL's capacity to address these challenges.

In short, the published articles embody a comprehensive approach to the advancement of AAL solutions, illustrating the need to combine innovative technologies with user-centered design principles. This integration aims not only to advance health monitoring and intervention strategies, but also to elevate the overall quality of care and life for users, particularly the elderly and people with disabilities, making a compelling case for continued exploration and adoption of AAL technologies.

This special issue is bound to succeed as it facilitates new applications, outcomes, and advancements in AAL. This is

due to many people who directly and indirectly contributed to it, and without whom this special issue would never have seen the light. The guest editors would like to take this opportunity to express sincere thanks to the Editor-in-Chief of the Springer Ambient Intelligence and Humanized Computing Journal for his valuable support and for providing us the privilege to edit a special issue in this high-quality journal. The guest editors are deeply indebted to authors for the efforts they put in the preparation of their manuscripts and for their valuable contributions. We wish to express our deepest gratitude to the referees for their professional effort, insight, and hard work put into commenting on the selected articles that reflect the essence of this special issue. And last but not the least, we want to thank all the readers of this issue: it is our sincere hope that the knowledge shared here will inspire and facilitate further advancements in the AAL field.

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