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Editorial: Body-centric computing for health and wellbeing

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Editorial on the Research Topic
Body-centric computing for health and wellbeing

1 Introduction

Body-centric computing is rapidly emerging as a transformative approach for enhancing health and wellbeing. This field focuses on the integration of computational technologies with the human body, aiming to monitor, analyze, and improve various aspects of physical and mental health (Mueller et al., 2018).

At the core of body-centric computing are technologies such as wearable sensors, smart fabrics, and integrated devices that gather crucial health data in real time (Li et al., 2023). These technologies often track ones health metrics and encourage active wellness management (Ren et al., 2018). Its applications extend beyond mere health monitoring to include devices that support healthy living, enhance medical rehabilitation, personalize treatments, and improve overall wellbeing through immersive experiences. For example, wearables can measure exercise intensity, heart rate changes, and mood fluctuations to offer personalized health advice, encouraging users to adjust their lifestyles for improved wellbeing. Another example includes augmented reality glasses that facilitate stress-relieving breathing exercises within natural environment settings, aiming to lower anxiety and bolster mental health (Zheng et al., 2023).

In recent years, interest in body-centric computing for health and wellbeing has increased, with a growing emphasis on developing user-friendly technologies that seamlessly integrate into daily life. The ultimate aim is to create a symbiotic relationship between the human body and digital technology, enabling individuals to proactively manage their health and wellbeing with informed, data-driven decisions, thereby offering a new paradigm in health and wellness management.

In this Research Topic, we call for submissions that explore the use of body-centric computing for health and wellbeing enhancement. We are interested in the innovative development of body-centric technologies like biosensors, wearables, and also algorithms for health monitoring and intervention. Studies that integrate these technologies into everyday life to improve health awareness and self-care are encouraged. We also look for research demonstrating practical applications in promoting physical health and mental wellbeing through interactive technology. Our aim is to gain insights into the latest developments, address challenges, and outline future directions in body-centric computing.

2 Contributions

In total, five articles were eventually accepted in this Research Topic. These studies offer a diverse array of insights ranging from design implications and health monitoring to practical applications, each pushing the boundaries of how we integrate technology with the human body for enhanced living. Below, we provide a brief overview of these innovative contributions.

2.1 Design implications

Morris et al. explore the design of wearables that engage directly with user awareness with varied feedback types, aiming to balance maintaining alertness while minimizing the use of cognitive resources. Through the development of a wearable and conducting associated user studies, the research reveals that feedback deviating from expected patterns significantly heightens user awareness, subsequently increasing cognitive load and reducing sense of agency and body ownership. Additionally, they observed a notable relationship between interoceptive awareness and reduced agency. These findings are instrumental for the future design of wearable technologies, highlighting the significance of feedback design in managing user awareness, cognitive load, and overall experience. Such insights are crucial for body-centric computing, guiding the development of wearables that better integrate in daily life.

Xu et al. investigate how spectator NPCs enhance player engagement and performance in VR exergames. Initial research showed that including spectator NPCs and their feedback positively influences players performance, experience, and physical exertion in gesture-based VR exergames. Subsequent analysis of the impact of NPC numbers and feedback on gameplay demonstrated that a larger number of spectators significantly enhances game experience, player performance, and metrics such as average heart rate percentage. Furthermore, NPC feedback notably improved player performance and game experience, and reduced negative experiences, leading to design recommendations for optimizing VR exertion game experiences.

2.2 Health monitoring

Gohumpu et al. have developed a multi-modal emotion recognition system (ERS) leveraging peripheral signals such as photoplethysmography (PPG), galvanic skin response (GSR), and skin temperature (SKT). The associated experiments indicated that this system outperforms the performance of single-modal systems and also increases the accuracy of existing ERS applications. The study highlights the potential of incorporating multi-modal signals in everyday ERS, which holds promise for integration into body-centric systems for mental health monitoring.

Diaconau et al. explore the factors influencing long-term engagement in physical activity through a seven-week walking program. Utilizing artificial neural networks, the study determines that sustained physical exercise could be predicted by assessing fitness levels, environmental context, and cardiovascular health risks. Notably, adding BMI and cholesterol data to the models improves prediction accuracy. This research contributes to body-centric computing by providing hands-on methods for anticipating physical activity persistence. These insights are valuable for crafting tailored health monitoring systems that adjust to personal requirements and settings.

2.3 Applications

Li et al. introduce a method using physiological signal-sensing technology in handkerchiefs to help elderly, especially those with Alzheimer's disease, communicate their chronic pain non-verbally. By embedding sensors to detect pain-indicative physical activities and translating these into caregiver-comprehensible information, the presented system address the challenge caregivers face in recognizing pain. This work serves as a novel application of body-centric computing for wellbeing. The use of e-textiles offers a concrete method for pain communication beyond subjective reporting, providing a valuable tool for pain management in cognitively impaired elderly groups, and offers healthcare professionals a new way to enhance care and improve the wellbeing of patients with Alzheimer's disease.

3 Conclusion

The articles in this Research Topic collectively showcase emerging opportunities for integrating digital technologies to advance health and wellbeing. Through innovative designs, enhanced interactions, and cutting-edge techniques, this research sets the stage for a future where body-centric computing naturally integrates into daily life, enriching our engagement with our physical and mental health.

Author contributions

ZL: Writing – original draft, Writing – review & editing. XR: Writing – review & editing. CL: Writing – review & editing. DD: Writing – review & editing. XF: Writing – review & editing.

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Conflict of interest

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References

Li, Z., Wang, Y., Andres, J., Semertzidis, N., Greuter, S., and Mueller, F. (2023). A design framework for ingestible play. *ACM Trans. Comput. Hum. Inter*. 30, 1–39. doi: 10.1145/3589954

Mueller, F. F., Andres, J., Marshall, J., Svanæs, D., Schraefel, M. C., Gerling, K., et al. (2018). Body-centric computing: Results from a weeklong dagstuhl seminar in a german castle. *Interactions* 25, 34–39. doi: 10.1145/3215854

Ren, X., Yu, B., Lu, Y., and Brombacher, A. (2018). "Exploring cooperative fitness tracking to encourage physical activity among office workers," in *Proceedings of the ACM on Human-Computer Interaction, 2(CSCW)*. doi: 10.1145/3274415

Zheng, X., Sun, S., Cao, Y., Li, J., Ding, D., and Li, Z. (2023). "Extended vr: Exploring the integration of VR experiences and real-world engagement," in *Companion Publication of the 2023 ACM Designing Interactive Systems Conference, DIS '23 Companion* (New York, NY, USA: Association for Computing Machinery), 184–187. doi: 10.1145/3563703.3596636