

Editorial

In an era marked by demographic shifts and rapid technological integration, research that bridges human well-being and digital innovation is more critical than ever. The two featured studies in this edition explore pressing issues at the intersection of public health and computational creativity. One addresses fall prevention among the elderly—a growing concern in aging societies—while the other pioneers a new way of interpreting musical performance through signal processing. Both exemplify how analytical rigor and interdisciplinary thinking can inform impactful real-world applications.

The increasing frequency and severity of falls among seniors have escalated into a significant public health and socio-economic issue. A deeper understanding of the physical mechanics behind such incidents is vital for developing preventive strategies. Through a detailed physical analysis of linear and rotational fall types, this study identifies how variations in motion affect impact force and injury risk. By applying principles of momentum, energy conservation, and impact duration, and validating outcomes through Pygame-based simulation, the research offers practical insights into injury mechanics. The results support targeted interventions and policy recommendations aimed at improving safety for the elderly, ultimately contributing to a healthier and more secure aging population [1].

Advancements in signal processing are redefining how we perceive and interact with music. A newly developed analytical software leverages short-time Fourier transform, non-negative matrix decomposition, and root mean square analysis to examine piano performance with remarkable precision. Programmed in Python, the tool quantifies musical expression through parameters such as touch strength, tempo, and pedal usage, revealing subtle performer-specific characteristics. This approach not only enables visual interpretation of musical waveforms but also opens pathways to systems that integrate auditory and visual stimuli—potentially transforming how musical training, analysis, and appreciation are approached in the future [2].

Together, these contributions demonstrate how cross-disciplinary research continues to enrich both societal welfare and technological advancement. Whether safeguarding vulnerable populations or enhancing artistic interpretation through computational tools, these studies reflect the evolving role of research in addressing diverse, meaningful challenges.

References:

- [1] E. Lee, A. Minjae Kim, E. Jekal, "Prevention Methods for Senior Falls," *Journal of Engineering Research and Sciences*, vol. 4, no. 3, pp. 1–7, 2025, doi:10.55708/js0403001.
- [2] E. Jekal, J. Ku, H. Park, "Software Development and Application for Sound Wave Analysis," *Journal of Engineering Research and Sciences*, vol. 4, no. 3, pp. 8–21, 2025, doi:10.55708/js0403002.

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