

Biomimetic Vestibular Physical Reservoir Computing as a Universal Stability Controller for Nonlinear Dynamical Systems

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Project Summary: This research aims to significantly enhance our understanding of complex dynamical systems and their information processing capabilities. Specifically, it focuses on the implementation of physical reservoir computing to investigate the intricate dynamics of the human vestibular system and its potential as a universal stability controller for complex systems. Situated within the inner ear, the vestibular system is one of the most complex dynamic systems, crucial for maintaining balance, spatial orientation, and synchronizing bodily and visual movements. The LUCI research addresses three key scientific inquiries: Firstly, it delves into harnessing the intricate and nonlinear behaviors inherent in complex systems for computational tasks while seeking suitable methodologies. Secondly, it explores the modeling of the intricate and nonlinear dynamics of the vestibular system to devise a universal stability controller for mobility systems. Finally, it outlines the potential DOD implications of the research.
