

Oscillator-Based Attention for Machine Learning Systems

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BRIEF DESCRIPTION

A novel method for implementing AI attention mechanism using the natural synchronization of physical oscillators, enabling more energy-efficient computation.

FULL DESCRIPTION

This technology replaces conventional digital computations of transformer attention with a physical mechanism based on coupled oscillators, where multiple oscillating elements influence each other and settle into stable patterns. Each input element corresponds to paired oscillators—one fixed and one free—whose interaction and natural dynamics encode attention values directly through their synchronized states. This deterministic and mathematically proven process enables attention computation through physical systems like electrical circuits or nanoelectromechanical resonators rather than digital arithmetic, allowing AI models to operate efficiently on low-power, small-scale hardware.

SUGGESTED USES

- » Edge AI sensors and devices requiring efficient deep learning
- » Wearable technologies with limited battery and computing resources
- » Autonomous systems needing real-time AI processing on embedded hardware
- » Next-generation neural network accelerators and AI chips
- » Quantum and nanoelectromechanical computing platforms

ADVANTAGES

- » Eliminates need for expensive digital arithmetic operations for attention computation
- » Enables deterministic and predictable physical computation of attention
- » Supports deployment on low-power, compact edge devices and wearables
- » Proven to match or exceed conventional attention performance in simulations
- » Reduces hardware complexity by leveraging natural physical dynamics

PATENT STATUS

Patent Pending

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OTHER INFORMATION

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