



Mobile Devices Conserve Energy by Adjusting Accuracy

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WARF: P130132US01

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method for improving efficiency using a multiplier circuit that adjusts computing accuracy during run time.

Overview

Achieving energy efficiency is important in mobile computing devices like smartphones and tablets because they rely on battery power but are constrained by size and weight. Moreover, these devices increasingly are using sophisticated human machine interfaces (HMI) that involve recognizing speech, gestures and handwriting.

Such 'recognition' tasks require large numbers of multiplication operations, for example, matrix multiplication. Specialized hardware multipliers that typically handle these high-speed operations are impractical for portable devices because they use too much energy.

The Invention

A UW-Madison researcher has developed multiplication circuitry that dynamically changes its accuracy (and energy usage) in response to operating demands. Accuracy is adjusted to meet particular computation tasks, power management strategies or error thresholds.

Specifically, a shift and accumulate multiplication circuit precomputes multiplicand shift amounts rather than computing them on the fly with a 'leading-one detector.' The circuit prestores the values in a coefficient memory. A controller adjusts accuracy according to processor needs.

Precomputation is possible in many recognition tasks associated with HMIs, where relatively static multiplier coefficients are used.

Applications

- Implementation in mobile devices, especially cell phones

Key Benefits

- Up to eight-fold improvement in energy efficiency
- Dynamic
- Adjusts to accuracy needs
- Suitable for portable devices

Stage of Development

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The method has demonstrated energy efficiency and a 90 percent while consuming as much as 10 percent less energy per multiplication.

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Additional Information

Related Technologies

- [WARF reference number P120224US01 describes a method for improving GPU performance using memory-link compression.](#)

Tech Fields

- [Information Technology : Computing methods, software & machine learning](#)

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846

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