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## **Conditional Boosting-Based, Low-Power Flip-Flop Design for Near-Threshold Voltage Management**

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**Abstract:** When the supply voltage is reduced to near the threshold, a conditional-boosting flip-flop is recommended for an ultralow voltage application. The proposed flip-flop employs voltage boosting to provide low delay and reduced performance variation in the near-threshold voltage region. By eliminating superfluous boosting processes, it further utilises conditional capture to lower switching power consumption. Results from experiments conducted in a 25-nm CMOS process showed that the proposed flip-flop could reduce latency by up to 72 percent, reduce performance variability by 75 percent due to process variation, and improve the energy-delay product by up to 67 percent at 25% switching activity, compared to traditional precharged differential flip-flops.

Keywords: Near-threshold, flip-flops, and bootstrapping



