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Radiation Mitigation Techniques for Mixed-Signal Circuits

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Abstract:

This talk overviews of basic and state-of-the-art approaches for the mitigation of radiation effects in analog and mixed-signal (analog + digital) circuits. The hardening of such components is typically thought to require a “brute force” approach; that is, area and power are often sacrificed through the increase of capacitance, device size, and current drive. Moreover, there are no standard metrics for radiation effects in analog and mixed-signal circuits as the responses are dependent on the circuit topology, implementation, operating mode, and technology. This presentation addresses these challenges by classifying various techniques based on a few underlying principles and illustrates how these mitigation principles can be manifest in topology-specific examples.

Short Bio:

Daniel Loveless is a Guerry Associate Professor of Electrical Engineering at UTC. They received a B.S. degree from Georgia Tech in 2004 and M.S. and Ph.D. degrees from Vanderbilt University in 2007 and 2009, respectively. Prior to joining UTC in 2014, Dr. Loveless was a Research Assistant Professor at the Institute for Space and Defense Electronics (ISDE) at Vanderbilt University. Their interests include radiation effects in electronic and photonic integrated circuits; radiation-hardened digital, mixed-signal, and analog integrated circuit design; and embedded systems. Dr. Loveless has published over 100 articles, is a Senior Member of IEEE, and is an Associate Editor of the IEEE Transactions on Nuclear Science. In 2019, they were awarded the Nuclear and Plasma Sciences Society (NPSS) Radiation Effects Early Achievement Award.

Organizers: