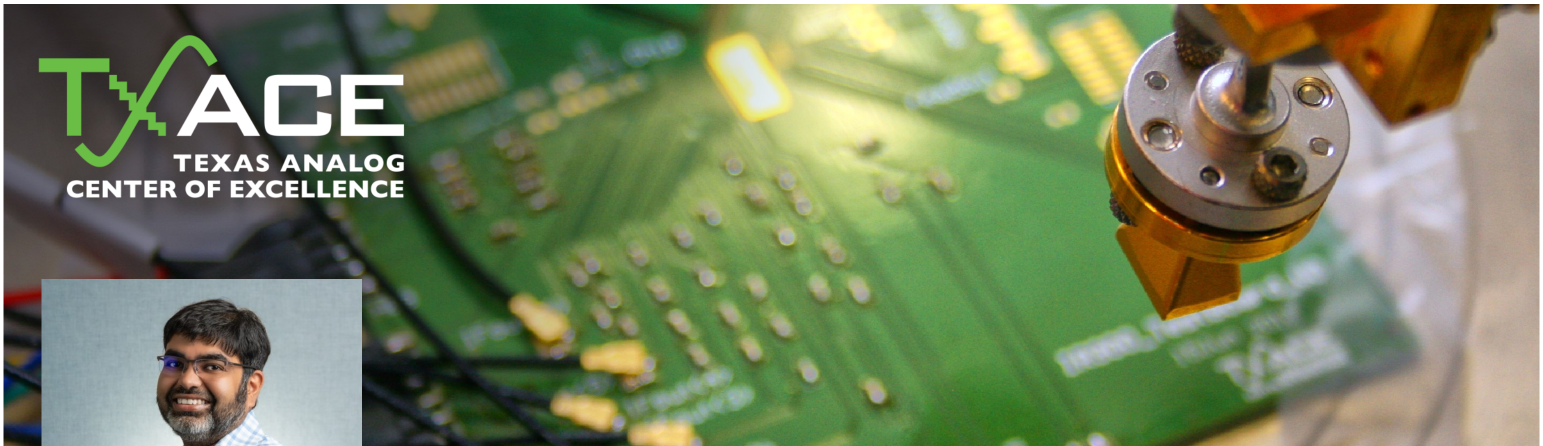

Machine Learning-based Functional Safety Improvement of AMS Components in Automotive SoCs

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BIO

Kanad Basu received his Ph.D. from the Department of Computer and Information Science and Engineering, University of Florida. His thesis was focused on improving signal observability for post-silicon validation. Post-PhD, Kanad worked in various semiconductor companies like IBM and Synopsys. During his PhD days, Kanad interned at Intel. Currently, Kanad is an Assistant Professor at the Electrical and Computer Engineering Department of the University of Texas at Dallas, where he leads the Trustworthy and Intelligent Embedded Systems (TIES) lab. Prior to this, Kanad was an Assistant Research Professor at the Electrical and Computer Engineering Department of NYU. He has authored 1 book, 2 US patents, 2 book chapters, and several peer-reviewed journal and conference articles. Kanad was awarded the "Best Paper Award" at the International Conference on VLSI Design 2011. Several News agencies have covered his research, including NBC Austin and CBS Dallas-Fort Worth. Kanad's current research interests are embedded safety and security.

ABSTRACT

With the proliferation of safety-critical applications in the automotive domain, it is imperative to guarantee the functional safety of circuits and components constituting automotive systems, e.g., the electrical and/or electronic subsystems in automotive vehicles. Analog and Mixed-Signal (AMS) circuits, prevalent in such systems, are more susceptible to faults than their digital counterparts due to advanced manufacturing nodes, parametric perturbations, environmental stress, etc. However, their continuous signal characteristics provide an opportunity for early anomaly detection, which, in turn, facilitates the deployment of safety mechanisms to prevent eventual system failure. In this talk, we will present a novel unsupervised machine learning-based framework to perform early anomaly detection in AMS circuits. Our approach involves anomaly injection in various circuit locations and individual components to develop a training dataset encompassing a wide range of possible anomalous scenarios, feature extraction from observation signals, feature and signal selection, and clustering algorithms to facilitate anomaly detection. Furthermore, we will present a time series-based analysis to improve the detection performance.

Friday, May 24, 2024 at 1:00 – 2:00 p.m.
Osborne Conference Room (ECSS 3.503)

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