2020 IEEE Asia Pacific Conference on Circuits and Systems (APCCAS 2020)

Ha Long, Vietnam
8 – 10 December 2020

IEEE Catalog Number: CFP20APC-POD
ISBN: 978-1-7281-9397-7

Copyright © 2020 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number: CFP20APC-POD
ISBN (Print-On-Demand): 978-1-7281-9397-7
ISBN (Online): 978-1-7281-9396-0

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

Table of Contents

The 2020 IEEE Asia Pacific Conference on Circuits and Systems

Table of Contents _____ iii

Preface _____ viii

Message from TPC co-Chair _____ ix

Conference Committee _____ x

Technical Program Committee _____ xi

Keynotes

Hardware Attack and Assurance with Machine Learning: A Security Threat to Circuits and Systems 1
Bah-Hwee Gwee

IoT and Blockchain: Technologies, Challenges, and Applications _____ 2
Ren Ping Liu

Technical Sessions

A 16-channel 50MS/s 14bit Pipelined-SAR ADC for Integrated Ultrasound Imaging Systems _____ 3
Yimin Wu; Jingchao Lan; Min Chen; Fan Ye; Junyan Ren

An Area-Power-Efficient AFE with NS-SAR ADC For High-Frequency Ultrasound Applications __ 7
Yimin Wu; Shuai Li; Longheng Luo; Fan Ye; Junyan Ren

A Two-step SAR ADC with Synchronous DEM Calibration Achieving Up to 15% Power Reduction _____ 11
Zhechong Lan; Li Dong; Xixin Jing; Liheng Liu; Ken Li; Ziyan Shen; Zhiming Li; Li Geng

Low power PMIC with two hybrid converters for TEG application _____ 15
Thinh Tran-Dinh; Hieu Minh Pham; Bac Phuong Dao; Hien Hoang-Thi; Loan Pham-Nguyen; Sang-Gug Lee; Hanh-Phuc Le

A Spur-Free Low-Complexity Hybrid Nested Bus-Splitting/SP-MASH Digital Delta-Sigma Modulator _____ 19
Tieu-Khanh Luong; Hong-Hanh Hoang; Hoang-Anh Nguyen-Minh; Dang Cong Bui; Son Bui; Trung-Kien Nguyen

ECC processor over the Koblitz curves with τ-NAF Converter and Square-Square-Add Algorithm 23
Ting Wang; Tsung-Te Liu

Efficient FPGA design for Convolutions in CNN based on FFT-pruning ____ 27
Liulu He; Xiaoru Xie; Jun Lin; Zhongfeng Wang

A DLL-based Body Bias Generator for Minimum Energy Operation with Independent P-well and N-well Bias ____ 31
Kentaro Nagai; Jun Shiomi; Hidetoshi Onodera

A Lightweight AEAD encryption core to secure IoT applications ____ 35
Ngo-Doanh Nguyen; Duy-Hieu Bui; Xuan-Tu Tran

A Low-Power Low-Noise Dynamic Comparator With Latch-Embedding Floating Amplifier ____ 39
Ziwei Li; Wenbin He; Fan Ye; Junyan Ren

Capacitive recombination calibration method to improve the performance of SAR ADC ____ 43
Hua Fan; Xinjie Wu; Quanyuan Feng; Ke Zhang; Jia Zhang

A Single-Stage Delay-Tuned Active Rectifier for Constant-Current Constant-Voltage Wireless Charging ____ 47
Xianglong Bai; Fangyu Mao; Yan Lu; Chenchang Zhan; Rui P. Martins

Design of SRAM cell using Voltage Lowering and Stacking Techniques for Low Power Applications ____ 50
Jitendra Kumar Mishra; Prasanna Kumar Misra; Manish Goswami

Dynamic Reduction of Power Consumption in Direct-RF Sampling Receivers with Variable Decimation ____ 54
Yuka Nakamatsu; Takao Kihara

High-Performance Implementation of Adaptive IQ Mismatch Compensator in Direct-Conversion Transceiver ____ 58
Van-Toan Nguyen; Viet-Son Bui; Trung-Kien Nguyen

Stress evolution analysis of EM-induced void growth for multi-segment interconnect wires ____ 62
Zaiyong Liu; Hai-Bao Chen; Tianshu Hou

Performance Analysis of Non-Profiled Side Channel Attacks Based on Convolutional Neural Networks ____ 66
Ngoc-Tuan Do; Van-Phuc Hoang; Van-Sang Doan

An Energy-Efficient Time-Domain Binary Neural Network Accelerator with Error-Detection in 28nm CMOS ____ 70
Yuxuan Du; Xinchao Shang; Weiwei Shan

Low-Power Implementation of a High-Throughput Multi-core AES Encryption Architecture ____ 74
Pham- Khoi Dong; Hung K. Nguyen; Van-Phuc Hoang; Xuan-Tu Tran

Sub-Sampling Phase-Locked Loop with Ultra-mini Dead Zone For Locking Time Reduction ____ 78
Yeqing Wang; Zhouchen Ma; Lei Zhang; Zongmin Wang; Yan Liu; Jian Zhao

Low Power Reference Voltage Buffer and High Density Unit capacitor in a 12b 200MS/s SAR ADC ____ 82
Wenbin He; Ziwei Li; Fan Ye; Junyan Ren

Open Top Socketed Evaluation Board for Bench Test and Fault Localization on GaAs RF Device ____ 86
Alex Marionne A. del Castillo; Ramon G. Garcia; Febus Reidj G. Cruz

A Self-coupled DT MASH ΔΣ Modulator with High Tolerance to Noise Leakage ____ 90
Gaofeng Tan; Haolin Lu; Xinyu Qin; Jiliang Zhang; Jingying Zhang; Yan Liu; Liang Qi

"Truth from Practice, Learning beyond Teaching" Exploration in teaching Analog Integrated Circuit ____ 94
Hua Fan; Xiaohu Qi; Quanyuan Feng

100 MHz Random Number Generator Design Using Interleaved Metastable NAND/NOR Latches 98
Chua-Chin Wang; Shao-Wei Lu

A RISC-V SoC for Mobile Payment Based on Visible Light Communication ____ 102
Xinchao Zhong; Chiu-Wing Sham; Longyu Ma

Digital Phase Estimation through an I/Q Approach for Angle of Arrival Full-Hardware Localization____ 106
Antonello Florio; Gianfranco Avitabile; Giuseppe Coviello

Frequency-Tunable Quasi-Elliptic Filter Using Liquid Metal ____ 110
Matthew Brown; Carlos E. Saavedra

Damage Position Identification of Wooden House Model Using Machine Learning ____ 114
Kohei Koike; Kenta Suzuki; Mengnan Ke; Kenjiro Mori; Takumi Ito; Takayuki Kawahara

A Highly Linear Amp-Less Interface Circuit for Capacitive Sensors with ΔΣ C-DAC____ 118
Yuya Maekawa; Shuya Nakagawa; Hiroki Ishikuro

A High-Performance Symmetric Hybrid Form Design for High-Order FIR Filters____ 121
Jinghao Ye; Masao Yanagisawa; Youhua Shi

Low-Noise Amplifier with Wideband Feedforward Linearisation for Mid-Band 5G Receivers ___ 125
Sarmad Ozan; Manish Nair; Tommaso Cappello; Mark A. Beach

Random Number Generator Based on Miniature Microbial Fuel Cells ____ 129
Celal Erbay; Salih Ergun

A Light-Weight Timing Resilient Scheme for Near-Threshold Efficient Digital ICs ____ 133
Xuemei Fan; Hongwei Li; Qiang Li; Hao Liu; Shengli Lu

An Efficient Accelerator of the Squaring for the Verifiable Delay Function Over a Class Group__ 137
Danyang Zhu; Yifeng Song; Jing Tian; Zhongfeng Wang; Haobo Yu

Fast Permutation Architecture on Encrypted Data for Secure Neural Network Inference ____ 141
Xiao Hu; Jing Tian; Zhongfeng Wang

3D-Modeling Dataset Augmentation for Underwater AUV Real-time Manipulations ____ 145
Chua-Chin Wang; Chia-Yi Huang; Chu-Han Lin; Chia-Hung Yeh; Guan-Xian Liu; Yu-Cheng Chou

Automatic Tongue Image Segmentation Based on Thresholding and an Improved Level Set Model ____ 149
Hongyu Gu; Zhecheng Yang; Hong Chen

Design and manufacture power pre-amplifier module for transmitter of ground station at S-band _ 153
Thi Ha Bui; Chinh Doan Tran; Xuan Huy Le; Gia Duong Bach

An Energy Operating System Adaptive for The Sustainable And Green Energy ____ 157
Yen-Bor Lin; Chih-Chieh Ma; Chong-Cheng Hsu; Ting-Chia Ou; Tsung-Chieh Cheng; Wen-Fu Chen

High Efficient Early-Complete Brute Force Elimination Method for Security Analysis of Camouflage IC ____ 161

Weng-Geng Ho; Chuan-Seng Ng; Nay Aung Kyaw; Ne Kyaw Zwa Lwin; Kwen-Siong Chong; Bah-Hwee Gwee

An Efficient FPGA Accelerator Optimized for High Throughput Sparse CNN Inference 165
Jiayu Wen; Yufei Ma; Zhongfeng Wang

Copper Coin over Thermal Via in PCB for Thermal Management of 12 W 169
Marcus Miguel V. Vicedo; Febus Reidj G. Cruz; Ramon G. Garcia

Fast Object Detection on the Road 173
T. Hui Teo; Yi Shu Tan

Graph Saliency Network: Using Graph Convolution Network on Saliency Detection 177
Heng-Sheng Lin; Jian-Jiun Ding; Jin-Yu Huang

Improved Angle Freeman Chain Code Using Improved Adaptive Arithmetic Coding 181
Ji-Ting Wu; Jian-Jiun Ding

Using Fully Connected and Convolutional Net for GAN-Based Face Swapping 185
Bo-Shue Lin; Ding-Wen Hsu; Chin-Han Shen; Hsu-Feng Hsiao

Dilated Residual Convolutional Neural Networks for Low-Dose CT Image Denoising 189
Nguyen Thanh Trung; Dinh-Hoan Trinh; Nguyen Linh Trung; Tran Thi Thuy Quynh; Manh-Ha Luu

Design of an 45nm NCFET Based Compute-in-SRAM for Energy-Efficient Machine Learning Applications 193
Chia-Heng Lee; Ying-Tuan Hsu; Tsung-Te Liu; Tzi-Dar Chiueh

Improvement of Generalization performance for Timber Health Monitoring using Machine Learning 197
Kenta Suzuki; Kohei Koike; Mengnan Ke; Kenjiro Mori; Takumi Ito; Takayuki Kawahara

LBFP: Logarithmic Block Floating Point Arithmetic for Deep Neural Networks 201
Chao Ni; Jinming Lu; Jun Lin; Zhongfeng Wang

A Calibration Scheme for Nonlinearity of the SAR-Pipelined ADCs Based on a Shared Neural Network 205
Min Chen; Yimin Wu; Jingchao Lan; Fan Ye; Chixiao Chen; Junyan Ren

A lightweight Max-Pooling method and architecture for Deep Spiking Convolutional Neural Networks 209
Duy-Anh Nguyen; Xuan-Tu Tran; Khanh N. Dang; Francesca Iacopi

ReRAM Device and Circuit Co-Design Challenges in Nano-scale CMOS Technology 213
Lu Lu; Ju Eon Kim; Vishal Sharma; Tony Tae-Hyoung Kim

Lossless EEG Compression Algorithm Based on Semi-Supervised Learning for VLSI Implementation 217
Yi-Hong Chen; Yan-Ting Liu; Tsun-Kuang Chi; Chiung-An Chen; Yih-Shyh Chiou; Ting-Lan Lin; Shih-Lun Chen

A 72-nW 440-mV Time Register Using Stacked-NMOS-Switched Gated Delay Cell in Biomedical Applications 220
Guowei Chen; Dang Cong Bui; Xinyang Yu; Md. Zahidul Islam; Atsuki Kobayashi; Kiichi Niitsu

Random Number Generator Based on Skew-tent Map and Chaotic Sampling 224
Salih Ergun; Sercan Tanriseven

Experimental Cryptanalysis of No-equilibrium Chaotic System Based Random Number Generator 228
Burak Acar; Tufan Coskun Karalar

Real-Time Hardware Implementation of 3D Sound Synthesis 232
Sathwik GS; Barun Kumar Acharya; Bilal Ali; Deepu S. P.; Sumam David S.

Axial Resolution Enhancement of Light Sheet Microscopy via Two Light Sheet 236
Vannhu Le; Minhnghia Pham; Vandang Hoang

Revisit to Floating-Point Division Algorithm Based on Taylor-Series Expansion 240
Jianglin Wei; Anna Kuwana; Haruo Kobayashi; Kazuyoshi Kubo

Missing Temperature Data Recovery Methods Based on Smoothness, Bandlimitedness and Sparseness Priors 244
Chien-Cheng Tseng; Su-Ling Lee

Learning Enriched Features for Video Denoising with Convolutional Neural Network 248
Xianfeng Tang; Peining Zhen; Ming Kang; Hang Yi; Wei Wang; Hai-Bao Chen

Histogram of Oriented Gradients Feature Extraction Without Normalization 252
Ling Zhang; Wei Zhou; Jingwei Li; Juan Li; Xin

Author Index 256