

**2018 IEEE International  
Symposium on Smart  
Electronic Systems  
(iSES 2018) (Formerly iNiS)**

**Hyderabad, India  
17-19 December 2018**



**IEEE Catalog Number: CFP18C48-POD  
ISBN: 978-1-5386-9173-1**

**Copyright © 2018 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:	CFP18C48-POD
ISBN (Print-On-Demand):	978-1-5386-9173-1
ISBN (Online):	978-1-5386-9172-4

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# 2018 IEEE International Symposium on Smart Electronic Systems (iSES) (Formerly iNiS) **iSES 2018**

## Table of Contents

Message from General Chairs .xiii.....	
Message from Program Chairs .xv.....	
Conference Organization .xvi.....	
Program Committees .xvii.....	
Steering Committee .xx.....	
Keynotes .xxi.....	

### Session 1: Memory & Arithmetic Circuits

A 40nm Low Power High Stable SRAM Cell Using Separate Read Port and Sleep Transistor Methodology .1.....	
<i>Jitendra Kumar Mishra (Indian Institute of Information Technology), Harshit Srivastava (Indian Institute of Information Technology), Prasanna Kumar Misra (Indian Institute of Information Technology), and Manish Goswami (Indian Institute of Information Technology)</i>	
FPGA Implementation of Square and Cube Architecture Using Vedic Mathematics .6.....	
<i>Sampada Barve (National Institute of Technology Goa), Sithara Raveendran (National Institute of Technology Goa), Charudatta Korde (National Institute of Technology Goa), Trilochan Panigrahi (National Institute of Technology Goa), Nithin Kumar Y. B. (National Institute of Technology Goa), and Vasantha M. H. (National Institute of Technology Goa)</i>	

### Session 2 (Special): Energy Recovery and DSP Cores

Energy Recovery Circuit Design for Low Power VLSI .11.....	
<i>V S Kanchana Bhaaskaran Kanchana (Vellore Institute of Technology Chennai)</i>	
Integrating Compiler Driven Transformation and Simulated Annealing Based Floorplan for Optimized Transient Fault Tolerant DSP Cores .17.....	
<i>Anirban Sengupta (IIT Indore) and Deepak Kachave (IIT Indore)</i>	

### **Session 3: VLSI and Security Primitive**

- Parallel and Pipelined VLSI Implementation of the New Radix-2 DIT FFT Algorithm .21.....  
*Harsha Keerthan Samudrala (International Institute of Information Technology Hyderabad), Shaik Qadeer (MJCET), Syed Azeemuddin (IIIT Hyderabad), and Zafar Khan (IIT Hyderabad)*
- Modified Tent Map Based Design for True Random Number Generator .27.....  
*Dhirendra Kumar (Indian Institute of Information Technology), Kasif Nabi (Indian Institute of Information Technology), Prasanna Kumar Misra (Indian Institute of Information Technology), and Manish Goswami (Indian Institute of Information Technology)*

### **Session 4: (Special): IoT and Smart Health**

- Amazon Echo Enabled IoT Home Security System for Smart Home Environment .31.....  
*Himanshu Thapliyal (University of Kentucky), Nathan Ratajczak (University of Kentucky), Ole Wendroth (University of Kentucky), and Carson Labrado (University of Kentucky)*
- Towards Photoplethysmogram Based Non-Invasive Blood Pressure Classification .37.....  
*Rajdeep Kumar Nath (University of Kentucky), Himanshu Thapliyal (University of Kentucky), and Allison Caban-Holt (University of Kentucky)*

### **Session 5: Microhotplate: Modelling and Validation**

- Modeling of Square Microhotplate and its Validation with Experimental Results .40.....  
*Gaurav Saxena (IIIT Senapati)*
- Performance Evaluation of Square Microhotplate with Alternative Membrane Materials .46.....  
*Gaurav Saxena (IIIT Senapati)*

### **Session 6: Multi-Processors**

- Towards Analysing the Effect of Hybrid Caches on the Temperature of Tiled Chip Multi-Processors .52.....  
*Ashwini Kulkarni (College of Engineering Pune), Khushboo Rani (IIT Guwahati), Sukarn Agarwal (IIT Guwahati), S. P. Mahajan (College of Engineering Pune), and Hemangee K. Kapoor (IIT Guwahati)*
- Real-Time Implementation of Blind and Robust Watermarking for HEVC Video Coding .58.....  
*Amit Joshi (MNIT-Jaipur), Vivek Jain (MNIT-Jaipur Rajasthan), Shubham Ladda (MNIT-Jaipur Rajasthan), and Raushan Kumar (MNIT-Jaipur Rajasthan)*

## Session 7: Placement and Application Mapping

- An Iterative Concave-Convex Wirelength Model for Analytical Placement .64.....  
*B. N. B. Ray (Utkal University), Sony Snigdha Sahoo (D. D. C. E. Utkal University), Rasheswari B. Ray (Ravenshaw University), Susil Kumar Mohanty (University of Hyderabad), and Debabrat Sethy (Utkal University)*
- Thermal Aware Application Mapping and Frequency Scaling for Mesh-Based Network-On-Chip Design .70.....  
*Raghav Sonavane (Indian Institute of Technology), Gobburi Sai Kashyap (Indian Institute of Technology), and Santanu Chattopadhyay (Indian Institute of Technology)*

## Session 8: FPGA Design & Arithmetic Circuits

- Zynq FPGA Based System Design for Video Surveillance with Sobel Edge Detection .76.....  
*Sagar Eetha (Amrita University), Sonali Agarwal (Amrita University), and Srikanth Neelam (Invecas)*
- Design of Area-Power-Delay Efficient Square Root Carry Select Adder .80.....  
*Chetan Kamble (Vignan's Foundation for Science, Technology & Research), Siddharth R. K. (National Institute of Technology Goa), Shivnarayan Patidar (National Institute of Technology Goa), Vasantha M. H. (National Institute of Technology Goa), and Nithin Kumar Y. B. (National Institute of Technology Goa)*

## Session 9: Analog Design

- Design and Analysis of Current Starved VCO Targeting SCL 180 nm CMOS Process .86.....  
*Chandra Shekhar (IIT Kanpur) and Shafti Qureshi (IIT Kanpur)*

## Session 10: Memory and Approximate Computing

- Correlation of Dynamic and Static Metrics of SRAM Cell under Time-Zero Variability and After NBTI Degradation .90.....  
*Sarthak Prakash Chaudhari (Shiv Nadar University), Jani Babu Shaik (Shiv Nadar University), Sonal Singhal (Shiv Nadar University), and Nilesh Goel (BITS Pilani Dubai Campus)*
- Design and Analysis of Approximate Multipliers for Error-Tolerant Applications .94.....  
*Anirudha Pandey (National Institute of Technology Goa), Manikantta Reddy Karri (National Institute of Technology Goa), Praveen Yadav (National Institute of Technology Goa), Nithin Kumar Y. B. (National Institute of Technology Goa), and Vasantha M.H. (National Institute of Technology Goa)*

## Session 11: Sensing and Wireless IoT

- Sensor Data Compression Based on Re-Quantization of Sensor Data .98.....  
*Henning Idsøe (University of Agder), Linga Reddy Cenkeramaddi (University of Agder), and Soumya J (BITS Pilani)*
- Design, Development and Deployment of Low-Cost Short-Range Self-Powered Wireless IoT Devices .104.....  
*Rolf Arne Kjellby (University of Agder), Thor Eirik Johnsrud (University of Agder), Svein Erik Løtveit (University of Agder), Linga Reddy Cenkeramaddi (University of Agder), Baltasar Beferull Lozano (University of Agder), Soumya Joshi (BITS-Pilani Campus), Anders Frøytlog (University of Agder), Thomas Jordbru (University of Agder), and Meghana Bhange (Savitribai Phule Pune University)*

## Session 12: Secure MANET and Smart System

- Distributed Trust-Based Multiple Attack Prevention for Secure MANETs .108.....  
*Gurveen Vaseer (Oriental University), Garima Ghai (Oriental University), and Dhruva Ghai (Oriental University)*
- A Low-Cost Smart Vein Viewer System .114.....  
*Soumya Jindal (GGSIPI Delhi), Wazir Singh (IIT Delhi), and Sujay Deb (IIT Delhi)*

## Session 13: IoT Data Analytics and Memory Overflow

- Design of Software and Data Analytics for Self-Powered Wireless IoT Devices .118.....  
*Linga Reddy Cenkeramaddi (University of Agder), Ashish Goyal (BML Munjal University), Asheesh Bhuria (BML Munjal University), Srinivas M.B. (BML Munjal University), and Soumya J (Birla Institute of Technology and Science-Pilani)*
- ARPL: Supporting Adaptive Mixing of RPL Modes to Overcome Memory Overflow .124.....  
*Kunal Vyas (Indian Institute of Engineering Science and Technology), Jayasree Sengupta (Indian Institute of Engineering Science and Technology), and Sipra Das Bit (Indian Institute of Engineering Science and Technology)*

## Session 14: Energy Harvesting and IoT

- Energy Efficient Ultra Low Power Solar Harvesting System Design with MPPT for IOT Edge Node Devices .130  
*Saswat Kumar Ram (National Institute of Technology), Sauvagya Ranjan Sahoo (National Institute of Technology), Sudeendra K (National Institute of Technology), and Kamalakanta Mahapatra (National Institute of Technology)*
- A Practical Implementation of an Agriculture Field Monitoring Using Wireless Sensor Networks and IoT Enabled .134.....  
*Edmond Nurellari (University of Lincoln) and Saket Srivastava (University of Lincoln)*

## **Session 15 (Special): Systems for Smart Healthcare I**

- New Clinician-Controlled Composable Approaches to Health IT .140.....  
*Yalini Senathirajah (Biomedical Informatics University of Pittsburgh Medical School)*
- A Smart Sensor in the IoMT for Stress Level Detection .141.....  
*Laavanya Rachakonda (University of North Texas), Prabha Sundaravadivel (University of Texas at Tyler), Saraju P. Mohanty (University of North Texas), Elias Kougianos (University of North Texas), and Madhavi Ganapathiraju (University of Pittsburgh)*

## **Session 16 (Special):FPGA Designs for Innovative On-Chip Communication Solutions**

- Low Cost FPGA Implementation of a SPI over High Speed Optical SerDes .146.....  
*Saket Srivastava (University of Lincoln) and Peter Hobden (University of Lincoln)*
- 5Ghz Chirp Signal Generator for Broadband FMCW Radar Applications .152.....  
*Saket Srivastava (University of Lincoln) and Peter Hobden (University of Lincoln)*

## **Session 17 (Special): Systems for Smart Healthcare II**

- A Robust and Fast Seizure Detector for IoT Edge .156.....  
*Abu Sayeed (University of North Texas), Saraju P. Mohanty (University of North Texas), Elias Kougianos (University of North Texas), Venkata Prasanath Yanambaka (University of North Texas), and Hitten Zaveri (Yale University)*
- Smart-Pillow: An IoT Based Device for Stress Detection Considering Sleeping Habits .161.....  
*Laavanya Rachakonda (University of North Texas), Saraju P. Mohanty (University of North Texas), Elias Kougianos (University of North Texas), Kalyani Karunakaran (Indian Institute of Science), and Madhavi Ganapathiraju (University of Pittsburgh)*

## **Session 18 (Special): Big Data and IoT for Societal Issues in India**

- Three Tier Architecture for IoT Driven Health Monitoring System Using Raspberry Pi .167.....  
*Neel Kamal (Indian Institute of Engineering Science and Technology) and Prasun Ghosal (Indian Institute of Engineering Science and Technology)*
- Correlating Fatality Rate to Road Accidents in India: A Case Study Using Big Data .171.....  
*Subha Koley (Indian Institute of Engineering Science and Technology), Saket Srivastava (University of Lincoln), and Prasun Ghosal (Indian Institute of Engineering Science and Technology)*

## Session 19: Emerging Designs and Fabrication

- Heaping of Sorrow Upon Sorrow .177.....  
*Biswajit Bhowmik (Indian Institute of Information Technology Design and Manufacturing Kurnool Andhra Pradesh)*
- Compact UWB Antenna for S, C, and X Bands Applications .183.....  
*Anil Kumar Nayak (IIT Kharagpur), Debasis Gountia (CET Bhubaneswar), Baruna Kumar Turuk (NIT Rourkela), and Sashi Bhusan Panda (EAST, Bhubaneswar)*
- Characterization of Thin Zirconia Films Deposited by ECD on ITO Coated Glass for Biosensing Applications .187.....  
*Hiranya Ranjan Thakur (Tezpur University), Gaurav Keshwani (Tezpur University), and Jiten Chandra Dutta (Tezpur University)*

## Session 20: IoT and Vehicular Security

- Hardware Software Co-Simulation of Obfuscated 128-Bit AES Algorithm for Image Processing Applications .191.....  
*Surbhi Chhabra (The LNM Institute of Information Technology) and Kusum Lata (The LNM Institute of Information Technology)*
- An Attempt to Develop an IOT Based Vehicle Security System .195.....  
*Debajyoti Mukhopadhyay (NHITM (Mumbai University)), Megha Gupta (NHITM (Mumbai University)), Tahesin Attar (NHITM (Mumbai University)), Prajakta Chavan (NHITM (Mumbai University)), and Vidhi Patel (NHITM (Mumbai University))*
- Low Cost Stand-Alone Clap Only Detector .199.....  
*Ajaykumar Maurya (Indian Institute of Technology) and Sarath Manikandan (Indian Institute of Technology)*

## Session 21: Smart Systems and Design for IoT

- Smart Brewery Controller .203.....  
*Rolf Arne Kjellby (University of Agder), Erol Gorancic (University of Agder), Anders Liland (University of Agder), Linga Reddy Cenkeramaddi (University of Agder), and Geir Jevne (University of Agder)*
- Flicker Mitigating High Rate RLL Codes for VLC with Low Complexity Encoding and Decoding .209.....  
*uday Thummaluri (Indian Institute of Technology Hyderabad), Abhinav Kumar (Indian Institute of Technology Hyderabad), and Lakshmi Natarajan (Indian Institute of Technology Hyderabad)*

## Session 22: IoT and Smart City

- Design and Prototype Implementation of Long-Range Self-Powered Wireless IoT Devices .215.....  
*RolfArne Kjellby (University of Agder), Linga Reddy Cenkeramaddi (University of Agder), Thor Eirik Johnsrud (University of Agder), Geir Jevne (University of Agder), Svein Erik Løtveit (University of Agder), Baltasar Beferull Lozano (University of Agder), and Soumya Joshi (Birla Institute of Technology and Science-Pilani)*

Real Time Monitoring of AMR Enabled Energy Meter for AMI in Smart City - An IoT Application .219.....  
*Anirudh Kumar (Academy of Scientific and Innovative Research (AcSIR)),  
Sreyasi Thakur (Asansol Engineering College), and Partha Bhattacharjee  
(Academy of Scientific and Innovative Research (AcSIR))*

## **Session 23: Bio-Sensing and Biometric Systems**

Development of a Multi-Fog Based Water Quality Monitoring System Using Bio-Sensing Platform .223.....  
*Piyali Ganguly (University of Calcutta), Anirban Bose (University of  
Calcutta), Kaushik Chakraborty (University of Calcutta), Amlan  
Chakrabarti (University of Calcutta), and Anjan Kr. Dasgupta  
(University of Calcutta)*

Secure Biometric-Based Authentication Protocol for Vehicular Ad-Hoc Network .229.....  
*Md Ismail (Research Center Imarat), Santanu Chatterjee (Research  
Center Imarat), and Jamuna Kanta Sing (Jadavpur University)*

## **Session 24: Cybersecurity I**

Energy Comparison of Blockchain Platforms for Internet of Things .235.....  
*Sonam Sanju (Amrita Vishwa Vidyapeetham), Sriram Sankaran (Center for  
Cybersecurity Systems and Networks, Amrita Vishwa Vidyapeetham), and  
Krishnashree Achuthan (Center for Cybersecurity Systems and Networks,  
Amrita Vishwa Vidyapeetham)*

Non-Intrusive Appliance Identification for Energy Disaggregation of Indian Households–An Use Case  
for Energy Informatics .239.....  
*Anirudh Kumar (Academy of Scientific and Innovative Research (AcSIR))  
and Partha Bhattacharjee (Academy of Scientific and Innovative  
Research (AcSIR))*

## **Session 25: Power Efficient and Crosstalk Avoidance in NoC Design**

A Power Efficient Crossbar Arbitration in Multi-NoC for Multicast and Broadcast Traffic .243.....  
*Sonal Yadav (Malaviya National Institute of Technology ; Indian  
Institute of Technology), V. Laxmi (Malaviya National Institute of  
Technology), Hemangee K. Kapoor (Indian Institute of Technology),  
Manoj Singh Gaur (Malaviya National Institute of Technology ; Indian  
Institute of Technology), and Mark Zwolinski (University of  
Southampton)*

Multi-Bit Error Correction Coding with Crosstalk Avoidance Using Parity Sharing Technique for NoC .249....  
*Supriya Rajagopal (Amrita Vishwa Vidyapeetham), M. Vinodhini (Amrita  
Vishwa Vidyapeetham), and N.S. Murty (Amrita Vishwa Vidyapeetham)*

## **Session 26: Cybersecurity II**

Crypto Primitives IPCore Implementation Susceptibility in Cyber Physical System .255.....  
*Dillibabu Shanmugam (Society for Electronic Transactions and Security)  
and Suganya Annadurai (Society for Electronic Transactions and  
Security)*

A Novel Holistic Security Framework for In-Field Firmware Updates .261.....	
<i>Sudeendra kumar K (NIT Rourkela), Sauvagya Sahoo (NIT Rourkela), Krishna Kiran (NIT Rourkela), Ayas Kanta Swain (NIT Rourkela), and K.K. Mahapatra (NIT Rourkela)</i>	

## **Session 27: Embedded and Ad-Hoc Network**

Real-Time Efficient Detection in Vision Based Static Hand Gesture Recognition .265.....	
<i>Amrutnarayan Panigrahi (National Institute of Technology, Rourkela), Jaganath Prasad Mohanty (National Institute of Technology, Rourkela), Ayas Kanta Swain (National Institute of Technology, Rourkela), and Kamalakanta Mahapatra (National Institute of Technology, Rourkela)</i>	

## **Session 28: Student Research Forum**

Design of CMOS Inverter and Chain of Inverters Using Neural Networks .269.....	
<i>Likhit Valavala (BITS Pilani), Kalpit Munot (BITS Pilani), and Karri Babu Ravi Teja (BITS Pilani)</i>	
LHPUF: Lightweight Hybrid PUF for Enhanced Security in Internet of Things .275.....	
<i>Sriram Sankaran (Center for Cybersecurity Systems and Networks, Amrita Vishwa Vidyapeetham), Shivshankar S (Center for Cybersecurity Systems and Networks, Amrita Vishwa Vidyapeetham), and Nimmy K (Center for Cybersecurity Systems and Networks, Amrita Vishwa Vidyapeetham)</i>	
Comparison of Voltage Charging Techniques to Increase the Life of Lead Acid Batteries .279.....	
<i>Madhuri Bayya (Geethanjali College of Engineering and Technology), U.M. Rao (Geethanjali College of Engineering and Technology), BVVSN Prabhakara Rao (BITS-Pilani Hyderabad Campus), and N.Moorthy Muthukrishnan (BITS-Pilani Hyderabad Campus)</i>	

<b>Author Index 285.</b> .....	
--------------------------------	--