SHREYAS SEN

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https://engineering.purdue.edu/~shreyas/SparcLab/
Research Overview:
https://tinyurl.com/sparclab-purdue-research

Education:

Degree	*Date*	*School*
B.E. Tel. E.	June 2006	ETCE, Jadavpur University
M.S.E.	May 2009	ECE, Georgia Institute of Technology
Ph.D.	July 2011	ECE, Georgia Institute of Technology

Dissertation: *Design of Process and Environment Adaptive Ultra Low Power Wireless Circuits and Systems*

Work Experience:

Aug 2021 – present	Director, Center for Internet of Bodies (C-IoB) https://engineering.purdue.edu/C-IoB
May 2021 – present	Elmore Associate Professor, Elmore Family School of Electrical and Computer Engineering, Purdue University
Jan 2021 – present	Associate Professor, (courtsey) Weldon School of Biomedical Engineering, Purdue University
Jul 2020 – May 2021	Associate Professor, Elmore Family School of Electrical and Computer Engineering, Purdue University
Apr 2021 – present	Founder, Chairman & CTO, Quasistatics, Inc. (dba Ixana) (C. Corp version)
Nov 2018 – present	Founder & CEO, BDYWR, LLC
Jan 2016 – Jun 2020	Assistant Professor, School of Electrical and Computer Engineering, Purdue University
Sep 2011 – Dec 2015	Research Scientist, Circuit Research Lab (CRL), Wireless Communication Research (WCR) Intel Labs, Hillsboro, OR
Aug 2006 – Aug 2011	Graduate Research Assistant & Intel Ph.D. Fellow, Department of Electrical and Computer Engineering, Georgia Institute of Technology
May 2009 – Aug 2009	Communication Circuit Design Research Intern, Rambus Inc., Los Altos, CA

Jan 2008 – Aug 2008	RFIC Design Co-op, Qualcomm Inc., Austin, TX
May 2005 – Jul 2005	YEFP Research Fellow, Indian Institute of Science (IISC), Bangalore, India
Jan 2005 – May 2006	Bachelor's Thesis Research, Advanced VLSI Lab, IIT Kharagpur

Awards and Honors:

NAME OF AWARD/HONOR	DATE	BRIEF DESCRIPTION OF SIGNIFICANCE
At Purdue (Assistant/Associate Professor)		
IEEE SSCS Distinguished Lecturer (DL)	2024-2025	The Solid-State Circuits Society (SSCS) DL Program provides experts in the Society's areas of interest to speak at chapter meetings and regional seminars. Our lecturers, who serve for overlapping two-year terms, are deeply knowledgeable and excellent communicators. Their range of topics focuses on current IC activities, such as technology direction; novel devices, memories, and radio technology; high-speed and precision data converters; wireline and on-chip communication; low-noise clocking, and low power design. https://sscs.ieee.org/education/distinguished-lecturer-program/ https://sscs.ieee.org/education/distinguished-lecturer-program/distinguished-lecturer-roster/
Misties Award Finalist	2023	Misties Award recognizes Individual Leaders in Intelligent and Connected Devices, every year. Prof. Sen was recognized as an innovator who has commercialized Wi-R wireless technology, enabling high speed data communication using the human body. Purdue ECE News Release, Misties Award
IEDC Yearbook Feature	2023	Indiana Economic Development Corporation (IEDC) highlights most important people for the year.
Georgia Tech Alumni Association 40 Under 40	2022	This annual program showcases how Tech graduates impact every industry worldwide and work to improve the way we live through their diligence and expertise from an early age. Sen was chosen for the honor in recognition of his invention of the Electro-Quasistatic Human Body Communication, which uses the human body as a wire to securely communicate at orders of magnitude in power lower than radio communication. Purdue News, Georgia Tech Recognition
Outstanding Student Paper Award, IEEE Custom Integrated Circuits Conference (**CICC**)	2021	CICC is s tier-1 preeminent conference in the field of Integrated Circuits design. **2nd time in 3 years.** This award is given to the best paper among all papers with a student first author.
Purdue College of Engineering **(CoE) Faculty Excellence Award** for Early Career Research	2021	To recognize faculty for early career research excellence in Purdue College of Engineering.
Intel's 2020 Outstanding Researcher Award	2021	Intel sponsors about thousand worldwide lead academic researchers annually. Annually, Intel recognizes the exceptional contributions made through Intel university-sponsored research with Outstanding Researcher Awards. In selecting the award winners,

		careful consideration has been given to aspects of the sponsored research such as fundamental insights, technical difficulty, effective collaboration, potential student hiring, and industry relevance particularly to Intel. https://intel.ly/2NDjptm
Best Demo Award (2nd) in IEEE Hardware Oriented Security and Trust (HOST)	2020	Given to live demos presented at IEEE HOST **4th year in a row at IEEE HOST (Hardware Security)**
NSF CAREER Award	2020	The Faculty Early Career Development (CAREER) Program is a Foundation-wide activity that offers the National Science Foundation's most prestigious awards in support of early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization.
TEDx Indianapolis	2019	Invited Speaker on Body as a Wire (TED website)
Best Paper Award, IEEE Custom Integrated Circuits Conference (**CICC**)	2019	CICC is s tier-1 preeminent conference in the field of Integrated Circuits design. This is the best and most prestigious award at CICC
Best Student Paper Award in IEEE Hardware Oriented Security and Trust (HOST)	2019	IEEE HOST is the premier Hardware Security conference. This award is given to the best paper with a student as a first author. **3rd year in a row at IEEE HOST(Hardware Security)**
MIT TR35 India Award Massachusetts Institute of Technology (MIT), Technology Review Inventor Under 35 (TR35)	2018	Top 10 Indian Inventors Worldwide under 35 • *From **MIT Technology Review** and Hindustan Times Mint newspaper for the invention of using 'Human Body as a Wire' with widespread potential impact on Healthcare, Human Computer Interaction and Neuroscience* • *Led to appearance on Indian **National Television CNBC TV18** Young Turks Program*
Best Poster Award (3rd) in IEEE Hardware Oriented Security and Trust (HOST)	2018	Given to short papers with a poster presentation
Eta Kappa Nu (**HKN) Outstanding Professor Award**	2018	Overall most significant award from Eta Kappa Nu (HKN) Beta Chapter at Purdue. Awarded to one Professor with most research impact every year
Seed for Success (ACORN) Award by Purdue EVPRP (x3)	2019 (x2) 2018 (x1)	Given in recognition of the accomplishments of investigators for their efforts in obtaining a $1 million dollar or more external sponsored award
National Science Foundations, NSF-CISE Research Initiation Initiative (**CRII**) Award	2017	NSF's Computer and Information Science and Engineering (CISE) Research Initiation Initiative (CRII) Award is targeted to encourage research independence as a first federal grant
Google Faculty Research Award (FRA)	2017	Google's prestigious award for faculty research, chosen by competitive proposal process inducing faculty at all ranks, in a wide variety of fields
Best Student Paper Award in IEEE Hardware Oriented Security and Trust (HOST)	2017	IEEE HOST is the premier Hardware Security conference. This award is given to the best paper with a student as a first author
Air Force Office of Scientific Research (AFOSR) Young Investigator (YIP) Award	2016	Department of Defense (DoD)/US Air Force Office of Scientific Research's most prestigious award in support of junior faculty

At Intel Labs (Senior Research Scientist)		
Intel Lab Divisional Recognition Award	2014	For outstanding contribution to the CPF-Serial & Millerton architecture which led to the new **USB C**-type specification In **2023**, on the occasion of Apple iPhone moving over to USB-C, Sen's invited article on USB-C was published by Fortune, PBS News Hour, Fast Company, The Conversation, among others.
Best-in-track Award in IEEE International Conference on Computer-Aided Design (ICCAD)	2014	IEEE ICCAD is a tier-1 conference in Electronic Design Automation (EDA)
Honorable Mention Award in IEEE VLSI Test Symposium (VTS)	2014	IEEE VTS is a tier-1 conference in Electronic Testing. Honorable Mention was given to the 2nd Best paper of the conference
Intel Lab Quality Award	2012	As a part of Signaling Research group for relentless drive to push the boundaries of Electrical Signaling Rates to fuel Intel's I/O Leadership
At Georgia Tech (PhD)		
Best Thesis Award at IEEE VLSI Test Symposium (VTS)	2012	IEEE VLSI Test Symposium (VTS) as a part of TTTC's E. J. McCluskey Doctoral Thesis Award.
Intel PhD Fellowship Award	2010	One of the most prestigious PhD fellowships in the VLSI area. INTEL's most prestigious award for a PhD student.
IEEE MTT-S Graduate Fellowship Award	2008	Most prestigious fellowship from IEEE Microwave Theory and Techniques Society (MTT-S) for PhD students (only 6 students selected worldwide in 2008)
Margarida Jacome Best Research Award	2007	By **UC Berkley** Gigascale System Research Center (**GSRC**) for "**VIZOR:** Virtually Zero Margin RF", that presented the first Channel-Adaptive Radio using System-level Quality feedback to trade-off power vs. performance while meeting Quality of Service (QoS) at all times to operate with minimum power possible.
Leading Ixana (Quasistatics Inc.), a Purdue Spin-off Company, as a Founder		
CES Innovation Award (2x)	**2023**	The Consumer Electronics Show (CES) **Innovation Awards** is an annual competition honoring outstanding design and engineering in consumer technology products. 1. Embedded Technologies: Ixana's Wi-R: 100x lower power 4Mbps chip for wearables 2. Computer Hardware & Components: Ixana's Wi-R: 100x lower power 4Mbps Body Area Network chip
EE Times Silicon 100 (2x)	**2023** **2024**	Every year, EE Times assembles a list of electronics and semiconductor startups that have the potential to create a lasting impact. The Silicon 100, now in its 23rd edition, is marked by three major trends: high levels of interest in artificial intelligence, a significant surge in Chinese startup activity and an increase in startup formation globally across the breadth of the electronics and semiconductor domain. 2023 Winners, 2024 Winners
Startup of the Year Mira Award	**2023**	New companies that have shown the greatest development, market traction and have the most

		promising potential for success including impressive year-over-year growth, company performance and management team. Startup of the year Mira Award link
IoT Breakthrough Award *IoT Wearables Innovation the Year*	**2024**	The Awards, dedicated to recognizing the creativity, hard work and success of IoT companies, technologies and products, is a part of the Tech Breakthrough organization, a leading market intelligence and recognition platform for technology leadership and innovation in today's most competitive categories of technology. 2024 Winners

Professional Services:

- **Associate Editor**
  - **Nature Scientific Reports**
    - Aug 2022 - present
  - **Frontiers in Electronics**
    - May 2021-present
  - **IEEE Design and Test (D&T)**
    - Jan 2016 –Dec 2019 (1st term)
    - Jan 2020 –Dec 2021 (2nd term)
    - Jan 2021 –present (3rd term)
- **Guest Editor**
  - Special Issue of the IEEE Journal of Solid-State Circuits (**JSSC**) on," *IEEE International Solid-State Circuits Conference* (**ISSCC** 2024), Dec 2024
  - Special Issue of the IEEE Solid-State Circuits Letters (**SSCL**) on IEEE Custom Integrated Circuits Conference (CICC 22), early 2023
  - Special Issue of the IEEE Solid-State Circuits Letters (**SSCL**) on IEEE Custom Integrated Circuits Conference (CICC 21), Oct 2021
  - Special Issue on "Intelligent Resource-Constrained Sensor Nodes," IEEE Design and Test (D&T), Feb 2019
- **Conference Organization**
  - ✓ **Organizing Committee**
    - IEEE International Conference on VLSI Design (VLSID) 2024 – Tutorial Chair
    - 22nd IEEE European Test Symposium (ETS) 2017 - Publicity Chair
  - ✓ **Track Chair/Co-Chair**
    - *"MHz-to-THz physical layer security"* IEEE International Microwave Symposium (**IMS** 2022, 2024 – later merged)
    - *"Digital, SoC, Systems",* IEEE Custom Integrated Circuits Conference (**CICC** 22)
    - *"Hardware Security II: Attack and Defense",* ACM/IEEE Design Automation Conference (**DAC** 21)
    - *"Digital, SoC, Systems",* IEEE Custom Integrated Circuits Conference (**CICC** 21)
    - *"MHz-to-THz physical layer security"* IEEE International Microwave Symposium (**IMS** 21)
    - *"Analog and Mixed-Signal",* IEEE International Conference on VLSI Design 2019, 2020

✓ **Special Session/Panel Organizer**

- IEEE Custom Integrated Circuits Conference (**CICC** 2018), *"The Vanishing Boundary between Digital and Analog"*
- ACM/IEEE Design Automation Conference 2016 (**DAC**), *"Enabling the Internet of Things: Context-Awareness in Sensing, Communication and Computing"*
- IEEE VLSI Test Symposium (**VTS** 2018), *"Intelligent Resource Constrained Sensor Nodes"*
- IEEE European Test Symposium 2017 (**ETS**), *"Design and Test Needs for Adaptive, Self-Learning and Cognitive Systems"*
- **IEEE Sensors** 2016, *"Context-aware, ultra-low power, energy harvested IoT sensor nodes"*
- IEEE International Mixed-Signals, Sensors and Systems Test Workshop (IMS3TW) 2016
- IEEE International Test Conference 2014 (**ITC**), Panel on *"Elevator talks on emerging test frontiers"*

- **Conference Program Committee**
  - IEEE International Solid-State Circuits Conference (**ISSCC 2024-2025**)
    - Track: Security (2024, 2025)
  - IEEE Custom Integrated Circuits Conference **(CICC 2019-2024)**
    - Track: Emerging Technology (2019), SoC (2020-2024)
  - IEEE International Microwave Symposium (**IMS 2021-2022, 2025**)
    - Track: Innovative MHz-to-THz systems and applications (2025)
    - Track: MHz-to-THz Physical Layer Security (2021-2022)
  - ACM Conference on Computer and Communications Security (**CCS 2022**)
  - ACM/IEEE Design Automation Conference 2016 **(DAC 2018-2021)**
    - Track: Analog Design (2018), Hardware Security (2019-2021), Late Breaking News (2020)
  - IEEE International Symposium on Hardware Oriented Security and Trust (**HOST** 2021)
  - IEEE International Symposium on Low Power Electronics and Design **(ISLPED 2018-20)**
  - IEEE International Conference on Design, Automation and Test in Europe **(DATE 2017-18)**
  - IEEE International Conference on Computer Aided Design **(ICCAD 2017-2019)**
  - IEEE European Test Symposium **(ETS 2017, 2018)**
  - IEEE International Conference on VLSI Design **(VLSID 2013-2015, 2017-2020, 2023)**
  - IEEE International Test Conference **(ITC 2014)**
  - IEEE International Mixed-Signals Test Workshop (IMSTW 2017, 2018)
  - IEEE International Symposium on VLSI Design and Test 2014
  - IEEE International Workshop on Test and Validation of High-Speed Analog Circuits (TVHAC 2013) held in conjunction with IEEE International Test Conference (ITC 2013)

- **Conference Session Chair**
  - IEEE International Microwave Symposium (**IMS 2025)**
    - Innovative Wired and Wireless Links
  - IEEE Custom Integrated Circuits Conference **(CICC 2024)**
    - Mixed-Signal Compute in Memory

- IEEE Custom Integrated Circuits Conference **(CICC 2021)**
    - Security Instances: Shielding the Achilles' Heel of Chips
- IEEE International Conference on VLSI Design **(VLSID 2020)**
    - AMS Modeling and Design
- IEEE Custom Integrated Circuits Conference **(CICC 2019)**
    - Circuits and Systems for Security
    - Educational Session: 56/112G Link Foundations
    - Forum-Alternative Computing Models using Analog/MS Computational Substrates
- ACM/IEEE Design Automation Conference (**DAC 2018**) for session "Arch Nemesis: Architectural Security"
- IEEE International Symposium on Low Power Electronics and Design **(ISLPED 2017)** for session *"Analog Circuit Design"*
- IEEE Engineering in Medicine and Biology Conference **(EMBC 2017)** for session *"Models for Clinical Decision Support"* – Co-chair
- IEEE International Test Conference **(ITC 2014)** for session *"Modeling and Measuring Complex Analog Behaviors."*
- ACM/IEEE Design Automation Conference **(DAC 2012)** for session *"The Dark Side of Test"*
- ACM/IEEE Design Automation Conference 2011 **(DAC 2011)** for session *"New Methods and Metrics in Test and Reliability"*
- Firing Line Expert in IEEE International Test Conference 2014 (**ITC 2014**) for session *"'Fool" Nyquist, Fix Nonlinearity, Tolerate Jitter"*
- IEEE National Aerospace Electronics Conference (NAECON 2016) for session *"Emerging Electronics and Microsystems"*

- Reviewer for **Journals**:
    - Nature Communications
    - IEEE Journal of Solid State Circuits (JSSC)
    - IEEE Transactions on Biomedical Engineering (TBME)
    - IEEE Transaction on Circuits & Systems I (TCAS I)
    - IEEE Transaction on Computer Aided Design (TCAD)
    - IEEE Transaction on Very Large-Scale Integration (TVLSI)
    - ACM Transactions on Design Automation of Electronic Systems (TODAES)
    - IEEE Transactions on Biomedical Circuits and Systems (TBioCAS)
    - IEEE Transactions on Information Forensics & Security (TIFS)
    - Frontiers in Neuroscience, section Neuromorphic Engineering
    - Scientific Reports (Nature)
    - IEEE Journal of Microwave Theory and Techniques (MTT)
    - Applied Physics Letters (APL)
    - IEEE Microwave and Wireless Components Letters (MWCL)
    - IEEE Design and Test Magazine (D&T)
    - IEEE Transaction on Circuits & Systems II (TCAS II)
    - IEEE Transactions on Power Electronics (TPEL)
    - IEEE Journal of Emerging and Selected Topics in Circuits and Systems (JETCAS)
    - IEEE Transactions on Industrial Electronics (TIE)
    - Electronics Letters

  - Springer Journal of Electronic Testing (JETTA)
  - IEEE Access
  - Journal of Hardware and Systems Security (HASS)
  - Springer Journal of Medical Systems (JOMS)
  - ACM Journal on Emerging Technologies in Computing Systems (JETC)

- Reviewer for **Conferences**:
  - ACM/IEEE Design Automation Conference (DAC)
  - IEEE International Microwave Sysmposium (IMS)
  - IEEE Design, Automation & Test in Europe (DATE)
  - IEEE International Symposium on Low Power Electronics & Design (ISLPED)
  - IEEE International Conference on Computer Aided Design (ICCAD)
  - IEEE Custom Integrated Circuits Conference (CICC)
  - IEEE International Test Conference (ITC)
  - IEEE VLSI Test Symposium (VTS)
  - IEEE International Conference on VLSI Design
  - IEEE European Test Symposium (ETS)
- Industry Support Group Member, IEEE International Mixed-Signals, Sensors and Systems Test Workshop (IMS3TW) 2015.
- **Industry Liaison** for Systems On Nanoscale Information fabriCs **(SONIC),** 2014-2015
- DAC Expert Reviewer 2014, 2016
- **Senior Member of IEEE, October 2017-present**
- Member of IEEE, 2011-2017, Student Member of IEEE 2005-2011

  Present/Past member of Societies: Solid-State Circuits Society (SSCS), Circuits and Systems Society (CAS), Microwave Theory and Techniques Society (MTT), Engineering in Medicine and Biology (EMBC)

Teaching

- **Teaching Honors**
  a. **List of Outstanding Engineering Teachers, Fall 2021** [link]
  b. **List of Outstanding Engineering Teachers, Spring 2019** [link]
- **ECE 270 Introduction to Digital System Design**
  1. Spring 2016: 235 students enrolled
  2. Fall 2016: 274 students enrolled
  3. Fall 2017: 286 students enrolled
  4. Fall 2018: 265 students enrolled
- **ECE 255 Introduction To Electronic Analysis And Design**
  1. Spring 2020: 69 students enrolled
- **ECE 477 Digital Systems Senior Project**
  1. Spring 2021: 53 students enrolled
  2. Fall 2022: 72 students enrolled

- **ECE 695** **High-Speed Mixed-Signal IC**
  New Grad **Course introduced and developed by Prof. Sen**
  1. Spring 2017: 13 students enrolled (+~10 students auditing)
  2. Spring 2018: 12 students enrolled
  3. Spring 2019: 11 students enrolled
  4. Fall 2021: 21 students enrolled
  5. Spring 2023: 6 students enrolled
  6. Spring 2024: 36 students enrolled
  7. Spring 2025: 47 students enrolled
- **ECE 559** **MOS VLSI Design**
  1. Fall 2019: 43 students enrolled
- **DFS/IE 590** **Secure Design Lifecycle**
  New Online Course introduced by Prof. Sen under the **Dean's initiative** for the **Intel-Purdue Design for Security (DFS)** badge program
  1. Fall 2018 (2nd Module)
  2. Spring 2019 (1st Module)
  3. Spring 2019 (2nd Module)
  4. Fall 2020 (2nd Module)
  5. Spring 2021 (1st Module)
- ECE 395 Circuit Fundamentals: Analog, Mixed-Singal, Digital
  - New UG Course introduced by Prof. Sen with Prof. Roy
  - First Offering: TBD
- ECE 595 **Quantum Circuits and Systems**
  - New 1-credit online course on Analog, Mixed-Signal Circuits for Quantum Systems
  - First Offering: TBD, tentative Fall 2025

Service and Outreach

- Member, Purdue Engineering Initiative (**PEI**) **Faculty Council on Engineering-Medicine**
  a. Continuing 2nd Term
- **Purdue Computes Search Committee, Fall 2023, Spring 2024**
- **IoT and Embedded Systems Faculty Search Committee, Fall 2022, Spring 2023**
- **Microelectronics Faculty Search Committee, Fall 2021, Spring 2022**
- **Executive Committee Member, IEEE Central Indiana Section**
- Reviewer for multiple proposals in **National Science Foundation (NSF) Review Panels**
- **ECE Graduate Committee**, Fall 2016 – Spring 2019
- **Grade Appeals Committee**, April 2019 - present
- Assisting **Graduate Admissions Committee** for admission decisions
- Keynote Speaker, Purdue IEEE Research Fair, representing ECE research to **undergraduate** students interested in ECE research. Strong interest and very well received.
- Undergraduate Student Advising at TeaTalk, organized by Chinese Engineering Students Council (CESC), Feb 2016
- Student Advising at VLSI and Circuit Design Student Faculty Luncheon, Apr 2016

Undergraduate Research Mentoring

1. More than 30 UG student advised till date, providing ECE Purdue undergraduate students a platform to be involved in graduate level research, and scientific research as a career choice.
2. Ms. Xinyi Jiang (published first author paper in end of Sophomore year under Prof. Sen's guidance. Attended NAECON conference, increasing research awareness in undergraduate minorities, and attract towards graduate research. She published her UG work in IEEE Transaction on Biomedical Engineering, ISLPED, NAECON and went on to receive a fellowship from UC Berkeley.
3. Mr. David Yang got interested since his sophomore year and now driving HBC based HCI research. Already submitted to two top HCI conferences.
4. Mr. Harideep Nair (Summer 16, PURE: Purdue Undergraduate Research Experience program, visiting intern from IIT Bombay, India).
5. Mr. Rafael Neiva da Cunha (Summer 16, Brazilian Govt. Science Without Borders Program)
6. Mentored 2 SURF Purdue UG students and 2 visiting interns from IIT, India in Summer 2019

Individual Student Guidance

- **Graduated Students**

1.	Shovan Maity	Aug 16 – Aug 19 **PhD** Defense Date: May 31, 2019 Joined: **Qualcomm**	Human Body Communication (HBC)
2.	Debayan Das	Aug 16 – Aug 21 **PhD** Defense Date: July 08, 2021 Joined: **Intel Corp.**	Electromagnetic Side-Channel Attack
3.	Baibhab Chatterjee	Jun 17 – Aug 22 PhD Defense Date: July 18, 2022 Joined: **University of Florida, ECE as Assistant Professor**	Implantable Analytics and Communication Circuits
4.	Mayukh Nath	Jun 18 – May 23 PhD Defense Date: May 12, 2023 Joined: **Corning**	HBC Electromagnetic Analysis
5.	Donghyun Seo	Aug 17 – Jun 23 PhD Defense Date: Jun 09, 2023 Joined: **Qualcomm**	EM Analysis and Circuits for Security
6.	Josef Danial	Aug 18 – Aug 20 MS Defense Date: July 30, 2020 Joined: **Centauri/AFRL**	EM, Machine Learning Side Channel Attack
7.	Rohan K Manna	Jan 19 – Apr 20 MS Defense Date: Apr 22, 2020 Joined: **PhD Purdue**	Machine Learning Side Channel Attack Modeling
8.	Shreeya Sriram	Aug 18 – Feb 21	Animal Body Communication

		MS Defense Date: Feb 17, 2021 Joined: **Analog Devices**	
9.	Shitij Avlani	Aug 18 – present MS Defense Date: May 24, 2021 Joined: **Microsoft**	Energy Harvested BioSensing Nodes
10.	Yi Xie	Aug 21 – Dec 23 MS Defense Date: Dec 08, 2023 Joined: **Ford Motor**	Measurements on TEG and Emanations
11.	Arunashish Datta	Jun 19 – Jul 24 PhD Defense Date: Jul 08, 2024 Joined: **Ixana**	Advanced Biophysics for EQS HBC
12.	Archisman Ghosh	Aug 19 – Jul 24 PhD Defense Date: Jul 15, 2024 Joined: **Ixana**	EM Side-Channel Attack and Defense
13.	Md Faizul Bari	Aug 19 – Dec 24 PhD Defense Date: Nov 08, 2024 Joined: **Postdoc Purdue**	EM Emanations Security

Post-Doctoral Associate/Visiting Scholar

No.	Student	Dates	Topic
14.	Gargi Bhattacharyya, MD	July 18 – July 21 Joined: **MD, Cleaveland Clinic**	Human Body Communication (HBC)
15.	Prof. Abhishek Srivastava, PhD	Dec 18 – July 20 Joined: **Assistant Professor, IIIT Hyderabad**	mm-wave, 5G, Communication Circuits
16.	Dr. Kurian Polachan	Mar 21 – Dec 22 Joined: **Assistant Professor, IIIT Bangalore**	Human Body Nodes

Graduate Students

No.	Student	Dates	Topic
17.	Gregory Chang	Aug 16 – Jul 18	ULP IoT Sensor Receiver Front-end
18.	Mananga Mutombo	Dec 16 – Aug 17	HBC Channel Modeling
19.	Parikha Mehrotra	May 18 – May 21	HBC and BioSensor Circuits
20.	Nirmoy Modak	Feb 19 – Dec 22	HBC Circuits

21.	David Yang	May 19 – present	Human Body Communication - HCI
22.	Gaurav Kumar K	Aug 19 - Dec 22	High-Speed Communication Circuits
23.	Jie Yang	Jun 20 – present	Intelligent Adaptive Radio
24.	Yudhajit Ray	Jan 21- present	High-Speed Communication Circuits
25.	John Gerguis	Jun 21 – May 22	Acoustic HBC
26.	Md. Abdur Rahman	Aug 21 – Dec 22	Security Circuits and Systems
27.	Gourab Barik	Aug 21 – present	Energy-efficient Mixed-Signal Circuits
28.	Seyedehmarzieh Rouhani	Aug 21 – Aug 23	Mixed-Signal Power Amplifiers
29.	Meghna Roy Chowdhury	Aug 21 - present	Low Power Human Body Nodes
30.	Samyadip Sarkar	Aug 21 - present	Human Body Communication
31.	Sukriti Shaw	Aug 21 - present	Low Power Human Body Nodes
32.	Lingke Ding	Aug 22 - present	Human Body Communication
33.	Ming-Che Li	Aug 22 - present	Secure ICs
34.	Harshit Naman	Aug 22 - present	High-Speed Mixed-Signal ICs
35.	Qi Huang	Aug 23 - present	HBC Theory
36.	Sarthak Antal	Aug 23 - present	HBC Measurements
37.	Ayan Biswas	Aug 24 - present	HBC BioPhysics
38.	Abdullah Sayeed	Aug 24 - present	Digital SoCs for Security
39.	Zhengbin Chen	Aug 24 - present	HBC System and Circuits
40.	Kun-Chen (Max) Lee	Jan 25 - present	Wearable HBC ICs

Undergraduate Students

No.	Student	Dates	Topic
41.	Xinyi Jiang	Feb 16 – present	Interference-Robust HBC
42.	Kavian Mojabe	Feb 16 – May 17	HBC Channel Modeling
43.	Shawn Nagar	May 16 – Dec 16	Secure NFC
44.	Harideep P. K. Nair	May 16 – July 16	EM Side-Channel Intern: PURE student from IIM Bombay
45.	Yousef M. Akbar	May 16 – Aug 16	Secure NFC
46.	Yuyang Wang	May 16 – Jun 16	EM Modeling of HBC Channel
47.	Rafael N. da Cunha	May 16 – Jul 16	BMIC Fuzzy Classifier Intern: Brazilian Govt. Science Without Borders Program

48.	Ribhav Agarwal	Jun 16 – Dec 17	Context-Aware Wireless
49.	Alek V. Patel	Jun 16 – Dec 16	Secure ICs
50.	Qiyue Liang	Aug 16 – Dec 16	EM Modeling of HBC Channel
51.	Rayane Chatrieux	Oct 16 – Aug 17	Phase-based Ranging
52.	David Yang	Jan 17 – present	IoT Mixed Signal Power Amplifier
53.	Yuqin Duan	Jan 17 – May 17	Low-Noise Amplifier for IoT Sensor Node
54.	Mingxuan He	Jan 17 – Present	Human Body Communication (HBC)
55.	Tania Chakraborty	May 17-Aug 17	Human Body Communication (HBC)
56.	Siddharth Inani	May 17-Aug 17	Human Body Communication (HBC)
57.	Sourjya Roy	May 17- Dec 17	ULP IoT Transmitter
58.	Shrihari Sridharan	May 17- Dec 17	ULP IoT Transmitter
59.	Raghav Malik	Sep 17 – Dec 17	EM Side-Channel
60.	Andrew Thomas Sooy	Sep 17 – Dec 17	Implantable Analytics
61.	Zhewen Pan	Jan 18 – Dec 18	HBC Receiver Circuits
62.	Xinyue Pan	Jan 18 – Dec 18	HBC Measurements
63.	Yuanqiu Tan	Jan 18 – Dec 18	HBC Measurements
64.	Scott Stanton Redford	Jan 18 – July 19	HBC Receiver Circuits
65.	Vignesh Ramachandran	Jan 19 – May 19	IoT Sensor Nodes
66.	Ayomide Arthur Bello	Jan 19 – May 19	IoT Sensor Nodes
67.	Chun Tao	Jan 19 – Aug 20	Human Body Communication
68.	Trevor David Speer	May 20 – present	Human Body Communication Demo
69.	Lakshya Goyal	May 21 – Aug 21	Low Power Camera
70.	Rudransh Agrawal	May 21 – Aug 21	Human Body Communication Demo
71.	Rohit Jammula	May 21 – Aug 21	Human Body Communication Demo
72.	Xu, Jiahao	May 21 – Aug 21	Embedded Computer Vision
73.	Micah Morefield	May 21 – Aug 21	Human Body Communication Demo
74.	Zhengsen Fu	May 21 – Aug 21	Human Body Communication Demo
75.	Ashita Bawankule	May 21 – Aug 21	HBC Channel Measurements

Service on Thesis or Dissertation Committee

No.	Student	Advisor	Preliminary Exam	Defense
1.	Zubair Azim	Prof. Kaushik Roy	02/17	04/18
2.	Ahmed Kamal Reza	Prof. Kaushik Roy	11/17	05/19
3.	Minsuk Koo	Prof. Kaushik Roy	11/18	TBD
4.	Yuanzhi Cao	Prof. Karthik Ramani	05/19	08/28/20
5.	Ahmed Abdelraheem	Prof. Dimitrious Peroulis	12/18	11/05/19
6.	Soubhagya Sutar	Prof. Vijay Raghunathan	04/26/19	07/22/20
7.	Gregory Chang	Prof. Minghao Qi	TBD	TBD
8.	Aayush Ankit	Prof. Kaushik Roy	05/03/19	08/27/20
9.	Sutton R. Hathorn	Prof. Prof. Saeed Mohammadi	TBD	TBD
10.	Indranil Chakraborty	Prof. Kaushik Roy	09/10/20	TBD
11.	Deboleena Roy	Prof. Kaushik Roy	10/23/20	07/12/2021
12.	Jacob Peter Schmelzel	Prof. Dimitrious Peroulis	TBD	TBD
13.	Subham Jain	Prof. Anand Raghunathan	04/27/18	08/16/19
14.	Chankyu Lee	Prof. Kaushik Roy	11/30/17	01/22/21
15.	John Scott Peterson	Prof. Saeed Mohammadi	TBD	TBD
16.	Jay Vatsal Shah	Prof. Pedro Irazoqui	08/21/20	TBD
17.	Udit Rawat	Prof. Dana Weinstein	09/13/21	09/12/22
18.	Mustafa Ali	Prof. Kaushik Roy	12/06/19	11/04/22
19.	Sayeed Shafayet Chowdhury	Prof. Kaushik Roy	03/31/23	08/12/24
20.	Sangamesh Kodge	Prof. Kaushik Roy	12/11/23	09/27/24
21.	Ajanta Saha	Prof. Ashraf Alam	07/12/23	09/30/24
22.	Shristi Das Biswas	Prof. Kaushik Roy	TBD	TBD

Research Grants and Contracts:

Fifty-Three (53) Research Grants; as PI (33) or Co-PI (20):

~$9.32 million (Sen's share) - ~$54.2 million (total)

New in 2024: ~$1.1 million (Sen's share) - ~$7.6 million (total)

Sponsors: National Science Foundation (**NSF**), Defense Advanced Research Projects Agency (**DARPA**), Intelligence Advanced Research Projects Activity (**IARPA**), AirForce Office of Scientific Research (AFOSR), AirForce Research Laboratory (**AFRL**), **Sandia** National Laboratory, **Indiana** Clinical and Translational Sciences Institute **(CTSI),** Semiconductor Research Corporation (SRC), **Eli Lilly and Company**, Google, Intel Corporation, Landauer, SmartFilm Consortium (Birck Nanotechnology Center, Purdue), **TSMC**, SAAB, Quasistatics

Grant Activity #53

1. Agency/Title of Grant:	TSMC Center for Secure Microelectronics Ecosystem (CSME) PQC and LWE SCA Y1
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	04/01/2025 - 03/31/2026
3. Total amount of award	~$0.5 million
4. Your role and amount for which are directly responsible:	Co-PI, $110,000
5. Co-Investigators	J. Appenzeller (PI)

Grant Activity #52

1. Agency/Title of Grant:	Quasistatics, Inc./Video Communication through Human Body Y5
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	06/01/2025 - 05/31/2026
3. Total amount of award	$300,000
4. Your role and amount for which are directly responsible:	PI, $300,000
5. Co-Investigators	NA

Grant Activity #51

1. Agency/Title of Grant:	IARPA SCISRS
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	03/19/2024 - 03/18/2025
3. Total amount of award	~$4.5 million (Phase III)
4. Your role and amount for which are directly responsible:	Co-PI, $250,000 (Phase III)
5. Co-Investigators	Expedition Technology (PI)

Grant Activity #50

1. Agency/Title of Grant:	TSMC Center for Secure Microelectronics Ecosystem (CSME) Security Quality Guarantee for Side-Channel Attack Protection Y4
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	02/05/2024 - 02/04/2025
3. Total amount of award	~$2 million
4. Your role and amount for which are directly responsible:	Co-PI, $140,000
5. Co-Investigators	J. Appenzeller (PI)

Grant Activity #49

1. Agency/Title of Grant:	Quasistatics, Inc./Video Communication through Human Body Y4
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	06/01/2024 - 05/31/2025
3. Total amount of award	$300,000
4. Your role and amount for which are directly responsible:	PI, $300,000
5. Co-Investigators	NA

Grant Activity #48

1. Agency/Title of Grant:	Sandia National Laboratory/EM Interference on the Ground Plane
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	10/12/2023 - 09/30/2026
3. Total amount of award	~$270,000
4. Your role and amount for which are directly responsible:	PI, $270,000
5. Co-Investigators	NA

Grant Activity #47

1. Agency/Title of Grant:	NSF SBIR Phase II: Ultra-Low-power Physically-Secure Video transfer with Electro-Quasistatic Human Body Communication enabling Distributed Computation for Lightweight Augmented Reality (Prime: BDYWR/Quasistatics)
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	12/01/2023 - 05/30/2025
3. Total amount of award	$128,500
4. Your role and amount for which are directly responsible:	PI, $128,500
5. Co-Investigators	NA

Grant Activity #46

1. Agency/Title of Grant:	IARPA SCISRS
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	03/19/2023 - 03/18/2024
3. Total amount of award	~$4 million (Phase II)
4. Your role and amount for which are directly responsible:	Co-PI, $250,000 (Phase II)
5. Co-Investigators	Expedition Technology (PI)

Grant Activity #45

1. Agency/Title of Grant:	Quasistatics, Inc./Video Communication through Human Body Y3
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	06/01/2023 - 05/31/2024
3. Total amount of award	$170,000
4. Your role and amount for which are directly responsible:	PI, $170,000
5. Co-Investigators	NA

Grant Activity #44

1. Agency/Title of Grant:	TSMC Center for Secure Microelectronics Ecosystem (CSME) Security Quality Guarantee for Side-Channel Attack Protection Y3
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	02/05/2023 - 02/04/2024
3. Total amount of award	~$2 million
4. Your role and amount for which are directly responsible:	Co-PI, $160,000
5. Co-Investigators	J. Appenzeller (PI)

Grant Activity #43

1. Agency/Title of Grant:	IARPA Dr. MOP
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	03/01/2022 - 06/30/2022
3. Total amount of award	~$250,000
4. Your role and amount for which are directly responsible:	Performer, $ 25,000
5. Co-Investigators	T. Mayer (PI) and other Co-PIs

Grant Activity #42

1. Agency/Title of Grant:	**Eli Lilly** and Company/Lilly — Connected Solutions
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	06/01/2022 - 05/31/2023
3. Total amount of award	**~$5.3 million**
4. Your role and amount for which are directly responsible:	Co-PI, $ 326586
5. Co-Investigators	T. Mayer (PI) and 19+ Co-PIs

Grant Activity #41

1. Agency/Title of Grant:	**Quasistatics, Inc.**/Video Communication through Human Body Y2
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	06/01/2022 - 05/31/2023
3. Total amount of award	$170,000
4. Your role and amount for which are directly responsible:	PI, $170,000
5. Co-Investigators	NA

Grant Activity #40

1. Agency/Title of Grant:	**TSMC Center for Secure Microelectronics Ecosystem (CSME)** Security Quality Guarantee for Side-Channel Attack Protection Y2
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	02/05/2022 - 02/04/2023
3. Total amount of award	**~$2 million**
4. Your role and amount for which are directly responsible:	Co-PI, $160,000
5. Co-Investigators	J. Appenzeller (PI)

Grant Activity #39

1. Agency/Title of Grant:	**Intel** Corporation/ Photonic Side-Channel Attacks
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	01/01/2022 - 12/31/2022
3. Total amount of award	$75,000
4. Your role and amount for which are directly responsible:	PI, $75,000
5. Co-Investigators	NA

Grant Activity #38

1. Agency/Title of Grant:	**IARPA** SCISRS
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	09/27/2021 - 03/18/2023
3. Total amount of award	**~$6.5 million** (Phase I)
4. Your role and amount for which are directly responsible:	Co-PI, $375,000 (Phase I)
5. Co-Investigators	Expedition Techology (PI)

Grant Activity #37

1. Agency/Title of Grant:	**Quasistatics, Inc.**/Video Communication through Human Body Y1
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	06/01/2021 - 05/31/2022
3. Total amount of award	$170,000
4. Your role and amount for which are directly responsible:	PI, $170,000
5. Co-Investigators	NA

Grant Activity #36

1. Agency/Title of Grant:	**Eli Lilly** and Company/Lilly — Connected Solutions
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	06/01/2021 - 05/31/2022
3. Total amount of award	**~$5.3 million**
4. Your role and amount for which are directly responsible:	Co-PI, $460,000
5. Co-Investigators	T. Mayer (PI) and 19+ Co-PIs

Grant Activity #35

1. Agency/Title of Grant:	**TSMC Center for Secure Microelectronics Ecosystem (CSME)** Security Quality Guarantee for Side-Channel Attack Protection Y1
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	02/05/2021 - 02/04/2022
3. Total amount of award	**~$2 million**
4. Your role and amount for which are directly responsible:	Co-PI, $160,000
5. Co-Investigators	J. Appenzeller (PI)

Grant Activity #34

1. Agency/Title of Grant:	Landauer, Inc/ MEMS-Scale Accumulating Radiation Sensor Program
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	01/01/2021 - 12/31/2021
3. Total amount of award	$150,000

4. Your role and amount for which are directly responsible:	PI, $90,000
5. Co-Investigators	D. Morisette (Co-PI)

Grant Activity #33

1. Agency/Title of Grant:	**NSF** SBIR Phase 1/ Physically Secure Wearable Key using Electro-Quasistatic Human Body Communication (Prime: BDYWR)
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	01/01/2021 - 12/31/2022
3. Total amount of award	$27,861
4. Your role and amount for which are directly responsible:	PI, $27,861
5. Co-Investigators	NA

Grant Activity #32

1. Agency/Title of Grant:	**Intel** Corporation/ Ground-up Root-Cause Analysis and Low-Overhead Generic Countermeasures for Electromagnetic Side-Channel Attacks
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	01/01/2021 - 12/31/2021
3. Total amount of award	$100,000
4. Your role and amount for which are directly responsible:	PI, $100,000
5. Co-Investigators	NA

Grant Activity #31

1. Agency/Title of Grant:	**AFRL** Pilot Health Monitoritng in RF-denied environment (Open Topic STTR, Phase 2, Prime: BDYWR)
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	09/15/2020-09/14/2021
3. Total amount of award	$75,000
4. Your role and amount for which are directly responsible:	PI, $75,000
5. Co-Investigators	NA

Grant Activity #30

1. Agency/Title of Grant:	**AFRL** Pilot Health Monitoritng in RF-denied environment (Open Topic STTR, Phase 1, Prime: BDYWR)
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	01/01/2020 - 03/31/2020
3. Total amount of award	$7,500
4. Your role and amount for which are directly responsible:	PI, $7,500
5. Co-Investigators	NA

Grant Activity #29

1. Agency/Title of Grant:	**DARPA** SCATE: EM Side-Channel Attack (STTR Phase II, Prime: Intrinsix, Corp)
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	4/7/2021 - 7/7/2022
3. Total amount of award	$1,846,585

4. Your role and amount for which are directly responsible:	PI, $105,000
5. Co-Investigators	NA

Grant Activity #28

1. Agency/Title of Grant:	PRF Research Grants
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	07/23/2020 - 07/22/2021
3. Total amount of award	$31,119
4. Your role and amount for which are directly responsible:	PI, $31,119
5. Co-Investigators	NA

Grant Activity #27

1. Agency/Title of Grant:	**SAAB**: Adaptive Wideband Digital Receivers with Fast Interference Detection and Tuning
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	09/01/2020 - 08/30/2022
3. Total amount of award	$394,191
4. Your role and amount for which are directly responsible:	PI, $197,100
5. Co-Investigators	D. Peroulis (Co-PI)

Grant Activity #26

1. Agency/Title of Grant:	**AFRL/Centauri**: RF-PSF: Radio Frequency Process Specific Fucntions
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	07/23/2020 - 07/22/2021
3. Total amount of award	$185,000
4. Your role and amount for which are directly responsible:	PI, $185,000
5. Co-Investigators	NA

Grant Activity #25

1. Agency/Title of Grant:	**Eli Lilly** and Company/Lilly — Connected Solutions
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	06/01/2020 - 05/31/2021
3. Total amount of award	$5.3 million
4. Your role and amount for which are directly responsible:	Co-PI, $475,000
5. Co-Investigators	T. Mayer (PI) and 19+ Co-PIs

Grant Activity #24

1. Agency/Title of Grant:	**NSF** I-Corps: I-Corps: Secure Two Factor Authentication with Wearable Hardware Key using Human Body as a Wire
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	10/01/2020 - 06/30/2020
3. Total amount of award	$50,000
4. Your role and amount for which are directly responsible:	PI, $50,000
5. Co-Investigators	NA

Grant Activity #23

1. Agency/Title of Grant:	Landauer, Inc/ MEMS-Scale Accumulating Radiation Sensor Program
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	10/01/2020 - 12/31/2020
3. Total amount of award	$145,000
4. Your role and amount for which are directly responsible:	PI, $89,000
5. Co-Investigators	D. Morisette (Co-PI)

Grant Activity #22

1. Agency/Title of Grant:	**NSF CAREER:** Body-Wire: Transforming Healthcare using Secure Human Body Connected Intelligent Nodes
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	01/01/2020 - 12/31/2024
3. Total amount of award	$500,000
4. Your role and amount for which are directly responsible:	PI, $500,000
5. Co-Investigators	NA

Grant Activity #21

1. Agency/Title of Grant:	**PIIN**
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	01/01/2020 - 12/31/2020
3. Total amount of award	$100,000
4. Your role and amount for which are directly responsible:	Co-PI, $16,000
5. Co-Investigators	Jayant Krishna (PI), R. Nawrocki, E. Bartlett, S. Pluta (Co-PI)

Grant Activity #20

1. Agency/Title of Grant:	**Intel** Corporation/ Ground-up Root-Cause Analysis and Low-Overhead Generic Countermeasures for Electromagnetic Side-Channel Attacks
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	01/01/2020 - 12/31/2020
3. Total amount of award	$100,000
4. Your role and amount for which are directly responsible:	PI, $100,000
5. Co-Investigators	NA

Grant Activity #19

1. Agency/Title of Grant:	**SRC** CHIRP/ Multi-Integrating Receivers (MIR) for >200Gbps, <0.5pJ/b Electrical Links using PAM8 on EMIB-like connectors over 100mm Channel
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	01/01/2020 - 12/31/2022
3. Total amount of award	$135,000 + $114,932 (Purdue)
4. Your role and amount for which are directly responsible:	PI, $249,932
5. Co-Investigators	NA

Grant Activity #18

1. Agency/Title of Grant:	**NSF** SaTC Eager/EAGER: Collaborative Research: Machine-Learning based Side-Channel Attack and Hardware Countermeasures
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	9/01/2019 - 08/31/2021
3. Total amount of award	$300,000
4. Your role and amount for which are directly responsible:	Co-PI, $150,000
5. Co-Investigators	A. Raychowdhury (PI, G. Tech)

Grant Activity #17

1. Agency/Title of Grant:	**Eli Lilly** and Company/Lilly — Connected Solutions
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	06/01/2019 - 05/31/2020
3. Total amount of award	$5.3 million
4. Your role and amount for which are directly responsible:	Co-PI, $475,000
5. Co-Investigators	S. Garimella (PI) and 19 other Co-PIs

Grant Activity #16

1. Agency/Title of Grant:	SmartFilms Consortium/ Energy-Harvested IoT Sensor Nodes with In-Sensor Analytics
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	06/01/2019 - 05/31/2020
3. Total amount of award	$35,000
4. Your role and amount for which are directly responsible:	PI, $35,000
5. Co-Investigators	NA

Grant Activity #15

1. Agency/Title of Grant:	**Indiana** Clinical and Translational Sciences Institute **(CTSI)/** An Ingestible Radar System for Real-time Gastric Accommodation and Motility Measurement
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	06/01/2019 - 05/31/2021
3. Total amount of award	$100,000
4. Your role and amount for which are directly responsible:	PI, $75,000
5. Co-Investigators	M. Ward (Co-PI), T. Nowak (Co-PI, IUSM)

Grant Activity #14

1. Agency/Title of Grant:	Landauer, Inc/ MEMS-Scale Accumulating Radiation Sensor Program
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	01/01/2019 - 12/31/2019
3. Total amount of award	$224,069
4. Your role and amount for which are directly responsible:	Co-PI, $150,000
5. Co-Investigators	D. Peroulis (PI), D. Morisette (Co-PI), C. Mousoulis (Co-PI)

Grant Activity #13

1. Agency/Title of Grant:	**Intel** Corporation/ Ground-up Root-Cause Analysis and Low-Overhead Generic Countermeasures for Electromagnetic Side-Channel Attacks
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	01/01/2019 - 12/31/2019
3. Total amount of award	$100,000
4. Your role and amount for which are directly responsible:	PI, $100,000
5. Co-Investigators	NA

Grant Activity #12

1. Agency/Title of Grant:	Landauer, Inc/ MEMS-Scale Accumulating Radiation Sensor Program
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	10/01/2018 - 12/31/2018
3. Total amount of award	$93,742
4. Your role and amount for which are directly responsible:	Co-PI, $39,930
5. Co-Investigators	D. Peroulis (PI), D. Morisette (Co-PI), C. Mousoulis (Co-PI)

Grant Activity #11

1. Agency/Title of Grant:	**DARPA** MTO/MIDAS/ MIDAS TOUCHES: Tiles Of Unreleased Clocks for Hybrid Electronic Steering
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	09/27/2018 - 09/26/2021
3. Total amount of award	$568,000
4. Your role and amount for which are directly responsible:	**PI**, $286,680
5. Co-Investigators	D. Weinstein (Co-PI)

Grant Activity #10

1. Agency/Title of Grant:	SmartFilms Consortium/ In-Sensor Analytics for IoT Sensor Nodes
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	09/01/2018 - 05/31/2019
3. Total amount of award	$30,000
4. Your role and amount for which are directly responsible:	PI, $30,000
5. Co-Investigators	NA

Grant Activity #9

1. Agency/Title of Grant:	**Eli Lilly** and Company/ Lilly — Connected Solutions
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	06/01/2018 - 05/31/2019
3. Total amount of award	$5 million
4. Your role and amount for which are directly responsible:	Co-PI, $493,628
5. Co-Investigators	S. Garimella (PI) and 14 other Co-PIs

Grant Activity #8

1. Agency/Title of Grant:	**Intel** Corporation/ Ground-up Root-Cause Analysis and Low-Overhead Generic Countermeasures for Electromagnetic Side-Channel Attacks
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	01/01/2018 - 12/31/2018
3. Total amount of award	$70,000
4. Your role and amount for which are directly responsible:	PI, $70,000
5. Co-Investigators	NA

Grant Activity #7

1. Agency/Title of Grant:	SmartFilms Consortium/ Finding Theoretical Energy-limit of Sensing
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	11/01/2017 - 08/31/2018
3. Total amount of award	$20,000
4. Your role and amount for which are directly responsible:	PI, $20,000
5. Co-Investigators	NA

Grant Activity #6

1. Agency/Title of Grant:	Landauer, Inc/ MEMS-Scale Accumulating Radiation Sensor Program
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	11/01/2017 - 09/30/2018
3. Total amount of award	$365,000
4. Your role and amount for which are directly responsible:	Co-PI, $83,771
5. Co-Investigators	D. Peroulis (PI), D. Morisette (Co-PI), C. Mousoulis (Co-PI)

Grant Activity #5

1. Agency/Title of Grant:	**NSF** SaTC/ EM and Power Side-Channel Attack Immunity through High-Efficiency Hardware Obfuscations
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	10/01/2017 - 09/30/2020
3. Total amount of award	$500,000
4. Your role and amount for which are directly responsible:	PI, $250,000
5. Co-Investigators	A. Raychowdhury (Co-PI, G. Tech)

Grant Activity #4 (also listed in Honors & Awards)

1. Agency/Title of Grant:	**AFOSR** YIP Award/ Security and Conduction Properties of Interference-Robust Human Body Communication (IR-HBC) for Secure Remote Health Monitoring using Physiological Sensor Data
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	09/30/2017 - 09/29/2020
3. Total amount of award	$358,688
4. Your role and amount for which are directly responsible:	PI, $358,688
5. Co-Investigators	NA

Grant Activity #3 (also listed in Honors & Awards)

1. Agency/Title of Grant:	**Google** Faculty Research Award (FRA)/ Secure Human-Internet using Dynamic Human Body Communication
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	04/01/2017 - 03/31/2018
3. Total amount of award	$41,954
4. Your role and amount for which are directly responsible:	PI, $41,954
5. Co-Investigators	NA

Grant Activity #2 (also listed in Honors & Awards)

1. Agency/Title of Grant:	**NSF** CISE CRII Award/ CRII: SHF: IMPLANALYTICS: Smart Implantable with In-Sensor Analytics and Body Coupled Power/Data Transfer
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	04/01/2017 – 03/31/2020
3. Total amount of award	$175,000
4. Your role and amount for which are directly responsible:	PI, $175,000
5. Co-Investigators	NA

Grant Activity #1

1. Agency/Title of Grant:	Semiconductor Research Corp (**SRC**)/ Self-Powered IoT Sensor Node with In-situ Data Analytics and Energy-Aware End-to-end Real-time Optimization
2. Duration of Funding (mm/dd/yy – mm/dd/yy):	12/01/2016 - 11/30/2019
3. Total amount of award	$321,000
4. Your role and amount for which are directly responsible:	Co-PI, $175,000
5. Co-Investigators	A. Raychowdhury (PI, G. Tech)

List of Publications:

- **Book Chapters**

1. D. Das, B. Chatterjee and S. Sen, Security of Analog, Mixed-Signal & RF Devices, to be published in the book 'Emerging Topics in Hardware Security', **Springer**, 2021
2. S. Sen, V. Natarajan and Abhijit Chatterjee, "Low Power Adaptive Mixed Signal/RF Circuits and Systems and Self-Healing Solutions," *Low-power Variation-Tolerant Design in Nanometer Silicon*, co-edited by S. Bhunia and S. Mukhopadhyay (Eds.), **Springer**, Nov 2010, 1st Edition., 2011, X, 240 p. 100 illus., Hardcover ISBN: 978-1-4419-7417-4.
3. S. Sen, Seetharam Narasimhan, Amit Konar, "A Novel Algorithm for Automatic Species Identification Using Principal Component Analysis," **Springer**'s *Lecture Notes in Computer Science (LNCS) series*. Vol. no. 3776. pp. 605-610.

- **Articles in Journals**

Starred (*) and underlined are Graduate students/Post-Doc* and undergraduate students mentored by Prof. Sen, respectively.

4. S. Sen and A. Ghosh* "Circuit-Level Techniques for Side-Channel Attack Resilience: A tutorial," in ***IEEE Solid-State Circuits Magazine, 2024 – Invited Tutorial,*** *Top ISSCC 2024 Tutorials*
5. L. Ding*, A. Datta*, and S. Sen, "Biophysical Modeling of Capacitive Electro-Quasistatic Human Body Powering". *in IEEE Transactions on Biomedical Engineering (**TBME**) – accepted*
6. M. Li*, A. Ghosh* and S. Sen "Approximate DCT and Quantization Techniques for Energy-Constrained Image Sensors," *in IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**), 2024*
7. S. Sarkar*, D. Yang*, M. Nath*, A. Datta*, S. Maity and S. Sen "Human-Structure and Human-Structure-Human Interaction in Electro-Quasistatic Regime," - *accepted in **Nature Communications Engineering***
8. A. Datta*, D. Yang*, S. Maity and S. Sen, "Touchscreen Communication (ToSCom): Electro-Quasistatic Body Communication during Touch Sensing," – *accepted in **Nature Communications Engineering***
9. D. Yang* and S. Sen "Electro-Quasistatic and Resonant Cavity Car Body Communication," *in – under revision in **Nature Communications Engineering***
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11. M.F. Bari*, M.R. Chowdhury* and S. Sen "A Computational Harmonic Detection Algorithm to Detect Data Leakage through EM Emanation," *in arXiv preprint arXiv:2410.16316, 2024*
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108. S. Kundu, A. Ghosh*, A. Karmakar*, S. Sen and I. Verbauwhede "Rudraksh: A compact and lightweight post-quantum key-encapsulation mechanism," *in Cryptology ePrint Archive, 2024 accepted in Workshop on Cryptographic Hardware and Embedded Systems (**CHES**)*
109. Y. Ray*, A. Ghosh*, and S. Sen, " A 54µW Design-Agnostic Clock, Voltage, and EM-Pulse Fault-Injection Attack Detection using Time-to-Voltage Conversion", *in Custom Integrated Circuit Conference (**CICC**) Apr 2025*
110. G. Barik*, H. Naman*, Y. Ray*, and S. Sen, " TD-dAJC: A 2pJ/pixel Time-Domain Weight and Integrating-MAC based direct-Analog-to-MJPEG Compression for Video Sensor Nodes", *in Custom Integrated Circuit Conference (**CICC**) Apr 2025*
111. H. Naman*, G. Barik*, and S. Sen, "*A Real-Time Memory-Less In-Sensor Time-Domain Convolution Processor with Programmable Kernel for Feature Extraction," in IEEE International Symposium on Circuits and Systems (**ISCAS**) May 2025*
112. MR Chowdhury*, and S. Sen, *"Measurement and Analysis of System Parameter Effects on Noise in EEG Systems," in IEEE International Symposium on Circuits and Systems (**ISCAS**) May 2025*

113. G. Barik*, S. Sarkar*, and S. Sen, " 60 Mbps Time-Domain Video Transfer using Body Communication", *in International Microwave Symposium (**IMS**) Jun 2025*
114. S. Sarkar*, L. Ding*, and S. Sen, " Body-Resonance Human Body Powering", *in International Microwave Symposium (**IMS**) Jun 2025*
115. S. Shaw*, D. Yang*, G. Barik*, and S. Sen, " Enhanced Channel Capacity Underwater Multi-Diver Communication with Dual-Resonant Magnetoquasistatic Coupling", *in International Microwave Symposium (**IMS**) Jun 2025*
116. S. Sen and A. Datta*, "Human-Inspired Distributed Wearable AI," *in Proceedings of the 61st ACM/IEEE Design Automation Conference (**DAC**), Jun 2024 – **Invited paper***
117. Q. Huang*, S. Sarkar* and S. Sen "Channel Variability in Human Body Communication with External Objects in Body Resonance Region," *in 2024 46th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (**EMBC**), Jul 2024*
118. A. Jiang, C. Acebal, B. Heyd, T. White, G. Kainth, A. Datta*, S. Sen, A. Khalifa and B. Chatterjee, "Exploring the Effects of Encapsulated Capacitive and Galvanic Transmitters for Implant-to-Wearable Scenarios in Human Body Communication," *in 2024 46th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (**EMBC**), Jul 2024*
119. S. Sarkar*, Q. Huang*, M. Nath* and S. Sen "Wearable Human Body Communication Channel Measurements in the Body Resonance Regime," *in IEEE/MTT-S International Microwave Symposium (**IMS**) Jun 2024*
120. Q. Huang*, S. Sarkar*, and S. Sen "Enabling Physically Secure Human Body Communication in Body Resonance Region with Faraday Fabric," *in IEEE MTT-S International Microwave Biomedical Conference (**IMBioC**), Jun 2024*
121. S. Sarkar*, M. R. Chowdhury*, Q. Huang*, and S. Sen "Material Property Based Analysis of Human Body Communication in Body Resonance Regime" *in IEEE MTT-S International Microwave Biomedical Conference (**IMBioC**), Jun 2024*
122. M. F. Bari*, and S. Sen, "NoiseHopper: Emission Hopping Air-Gap Covert Side Channel with Lower Probability of Detection" *in IEEE International Symposium on Hardware Oriented Security and Trust (**HOST**), 2024*
123. G. Barik*, B. Chatterjee*, G. Kumar* and S. Sen "A 65nm 21.9 pJ/Sa Pixel to PWM Conversion SoC with Time-domain Body Communication for ULP Body-Worn Video Sensor Nodes with Distributed Real-Time Inference," *in IEEE Custom Integrated Circuits Conference (**CICC**), Apr 2024*
124. M. R. Chowdhury*, A. Ghosh*, M. F. Bari*, and S. Sen, "Leveraging Ultra-Law-Power Wearables Using Distributed Neural Networks," *in IEEE 20th International Conference on Body Sensor Networks (**BSN**), Oct 2024*
125. A. Datta*, and S. Sen, "Invited: Can Wi-R enable perpetual IoB nodes? ", *in IEEE Biomedical Circuits and Systems Conference (**BioCAS**) - Oct 2023 -Invited Paper*
126. S. Sarkar*, A. Datta*, M. Nath*, D. Yang*, S. Maity, and S. Sen, "Electro-Quasistatic Human-Structure Coupling for Human Presence Detection and Secure Data Offloading", *in IEEE Engineering in Medicine and Biology Conference (**EMBC**) - Jul 2023*
127. A. Datta*, and S. Sen," IoB: The Vision of the Internet of Bodies", *in International Midwest Symposium on Circuits and Systems (MWSCAS) - Jun 2023 -Invited Paper*
128. M. F. Bari*, M. R. Chowdhury and S. Sen, "Is Broken Cable Breaking Your Security?", *in International Symposium on Circuits and Systems (ISCAS) - Jan 2023*
129. G. K. K*, G. Barik*, B. Chatterjee*, S. Bose, S. Maity, and S. Sen, "A 65nm 2.02mW 50Mbps Direct Analog to MJPEG Converter for Video Sensor Nodes using low-noise Switched Capacitor MAC-Quantizer with automatic calibration and Sparsity-aware ADC", *in Custom Integrated Circuit Conference (**CICC**) Apr 2023*
130. A. Ghosh*, Md. A. Rahman*, D. Das, S. Ghosh, and S. Sen, "Power and EM SCA Resilience in 65nm AES-256 Exploiting Clock-Slew Dependent Variability in CMOS Digital Circuits", *in Custom Integrated Circuit Conference (**CICC**) Apr 2023*
131. M. F. Bari*, M. R. Chowdhury* and S. Sen, "Long Range Detection of Emanation from HDMI Cables Using CNN and Transfer Learning", in Design, Automation and Test in Europe (***DATE***) Apr 2023

132. B. Chatterjee*, K. G. Kumar*, S. Xiao, G. Barik*, K. Jayant and S. Sen, "A 1.8µW 5.5 mm3 ADC-less Neural Implant SoC utilizing 13.2pJ/Sample Time-domain Bi-phasic Quasi-static Brain Communication with Direct Analog to Time Conversion," in IEEE 48th European Solid State Circuits Conference (**ESSCIRC**) 2022
133. M. F. Bari*, M. R. Chowdhury*, B. Chatterjee*, and S. Sen,"Detection of Rogue Devices using Unintended Near and Far-field Emanations with Spectral and Temporal Signatures", *in International Microwave Symposium (**IMS**) 2022*
134. M. F. Bari*, B. Chatterjee*, L. Duncan, and S. Sen,"RF-PSF: Zero-Trust Radio Frequency Process Specific Functions as Process Distinction Method", *in International Microwave Symposium (**IMS**) 2022*
135. B. Chatterjee*, A. Datta*, M. Nath*, G. Kumar K., N. Modak and S. Sen, *"A 65nm 63.3µW 15Mbps Transceiver with Switched-Capacitor Adiabatic Signaling and Combinatorial-Pulse-Position Modulation for Body-worn Video-Sensing AR Nodes," in IEEE International Solid-State Circuits Conference (**ISSCC**) 2022 - -* ***Invited for Demonstration Session***
136. A. Ghosh*, J. M. B. Mera, A. Karmakar, D. Das*, S. Ghosh, I. Verbauwhede, and S. Sen, *"A 334uW 0.158mm2 Saber Learning with Rounding based Post-Quantum Crypto Accelerator," in IEEE Custom Integrated Circuits Conference (**CICC**) 2022*
137. A. Ghosh*, D. Seo*, D. Das*, S. Ghosh, and S. Sen, *"A Digital Cascoded Signature Attenuation Countermeasure with Intelligent Malicious Voltage Drop Attack Detector for EM/Power SCA Resilient Parallel AES-256," in IEEE Custom Integrated Circuits Conference (**CICC**) 2022*
138. A. Ghosh*, D. Das*, S. Ghosh, and S. Sen, *"EM Self-Awareness and Resilience with Single On-chip Loop: Leakage Sensing, Attack Detection and Protection," in IEEE/ACMDesign, Automation & Test in Europe Conference & Exhibition (**DATE**) 2022.*
139. A. Srivastava*, B. Chatterjee*, D. Weinstein and S. Sen, "A Low Phase Noise 30 GHz Oscillator Topology for Resonant-Fin-Transistors Based High-Q On-chip Resonators in 14 nm Technology," *in 35th International Conference on VLSI Design (VLSID)*, 2022
140. A. Datta*, U. Kaur, V. Malacco, M. Nath*, B. Chatterjee*, S. S Donkin, R. M Voyles, S. Sen, "In-body to Out-of-body Communication Channel Modeling for Ruminant Animals for Smart Animal Agriculture," *in 43rd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (**EMBC**) 2021*
141. J. Blackstone, D. Das, A. Althoff, S. Sen, R. Kastner, "iSTELLAR: intermittent Signature aTtenuation Embedded CRYPTO with Low-Level metAl Routing," *in IEEE/ACM International Conference On Computer Aided Design (**ICCAD**) 2021*
142. A. Datta*, and S. Sen, "Physically-Secure Low-Power Human State Measurement using EQS-HBC and Edge-Analytics," *in IEEE Research and Applications of Photonics in Defense Conference (**RAPID**) 2021 –* ***Invited Talk and Paper***
143. D. Seo*, M. Nath*, D. Das*, B. Chatterjee*, S. Ghosh and S. Sen, "*PG-CAS: Patterned-Ground Co-Planar Capacitive Asymmetry Sensing for mm-Range EM Side-Channel Attack Probe Detection," in IEEE International Symposium on Circuits and Systems (**ISCAS**) 2021*
144. M. F. Bari*, B. Chatterjee*, and S. Sen, *"DIRAC: Dynamic-IRregulAr Clustering Algorithm with Incremental Learning for RF-based Trust Augmentation in IoT Device Authentication," in IEEE International Symposium on Circuits and Systems (**ISCAS**) 2021*
145. P. Mehrotra, B. Chatterjee, S. Maity, and S. Sen, *"Design Considerations for a Sub-25µW PLL with Multi-Phase Output and 1-450MHz Tuning Range," in IEEE International Symposium on Circuits and Systems (**ISCAS**) 2021*
146. B. Chatterjee*, G. Kumar*, M. Nath*, S. Xiao, N. Modak*, D. Das*, K. Jayant and S. Sen, "A 1.15µW 5.54mm3 Implant with a Bidirectional Neural Sensor and Stimulator SoC utilizing Bi-Phasic Quasi-static Brain Communication achieving 6kbps-10Mbps Uplink with Compressive Sensing and RO-PUF based Collision Avoidance," *in IEEE Symposia on VLSI Technology and Circuits (**VLSI**) 2021*
147. A. Datta*, B. Chatterjee*, M. Nath*, N. Modak*, and S. Sen, "Channel Modeling for Physically Secure Electro-Quasistatic In-Body to Out-of-Body Communication with Galvanic Tx and Multimodal Rx," *in IEEE MTT International Microwave Symposium, 2021 (**IMS**)*
148. M. F. Bari*, B. Chatterjee*, K. Sivanesan, L. Yang, and S. Sen, "High Accuracy RF-PUF for EM Security through Physical Feature Assistance using Public Wi-Fi Dataset," *in IEEE MTT International Microwave Symposium, 2021 (**IMS**)*

149. G. Kumar*, B. Chatterjee*, S. Sen, “A 16 pJ/bit 0.1-15Mbps Compressive Sensing IC with on-chip DWT Sparsifier for Audio Signals,” *in IEEE Custom Integrated Circuits Conference 2021 (**CICC**)*
150. N. Modak*, D. Das*, M. Nath*, B. Chatterjee*, G. Kumar*, S. Maity*, and S. Sen, “A 65nm Resonant Electro-Quasistatic 5-240uW Human Whole-Body Powering and 2.19uW Communication SoC with Automatic Maximum Resonant Power Tracking,” *in IEEE Custom Integrated Circuits Conference 2021 (**CICC**)*
151. D. Seo*, M. Nath*, D. Das*, S. Ghosh and S. Sen, “Enhanced Detection Range for EM Side-channel Attack Probes utilizing Co-planar Capacitive Asymmetry Sensing,” *in IEEE/ACM Design, Automation & Test in Europe Conference & Exhibition 2021 (**DATE**)*
152. G. Kumar*, B. Chatterjee*, and S. Sen, “OpenSerdes: An Open-Source Process-Portable All-Digital Serial Link,” *in IEEE/ACM Design, Automation & Test in Europe Conference & Exhibition 2021 (DATE)*
153. A. Ghosh*, D. Das*, J. Danial*, V. De, S. Ghosh, and S. Sen, “An EM/Power SCA-Resilient AES-256 with Synthesizable Signature Attenuation Using Digital-Friendly Current Source and RO-Bleed-Based Integrated Local Feedback and Global Switched-Mode Control,” in *IEEE International Solid-State Circuits Conference 2021 (**ISSCC**)* - ***Invited for Demonstration Session***
154. B. Chatterjee*, and S. Sen, “Energy-Efficient Deep Neural Networks with Mixed-Signal Neurons and Dense-Local and Sparse-Global Connectivity,” *in IEEE/ACM Asia and South Pacific Design Automation Conference 2021 (**ASP-DAC**)* - ***Invited***
155. D. Das*, M. Nath*, S. Ghosh, and S. Sen, “Killing EM Side-Channel Leakage at its Source,” *in 2020 IEEE 63rd International Midwest Symposium on Circuits and Systems (MWSCAS)* August, 2020 (pp. 1108-1111) - ***Invited***
156. N. Cao, B. Chatterjee*, M. Gong, M. Chang, S. Sen and A. Raychowdhury, "A 65nm Image Processing SoC Supporting Multiple DNN Models and Real-Time Computation-Communication Trade-off via Actor-Critical Neuro-Controller," *in IEEE Symposia on VLSI Technology and Circuits (**VLSI**) 2020*
157. S. Avlani*, M. Nath*, S. Maity* and S. Sen, "A 100KHz-1GHz Termination-dependent Human Body Communication Channel Measurement using Miniaturized Wearable Devices," *in IEEE/ACM Design, Automation & Test in Europe Conference & Exhibition 2020 (**DATE**)*
158. B. Chatterjee*, A. Srivastava, D. Seo*, D. Yang* and S. Sen, “A Context-aware Reconfigurable Transmitter with 2.24 pJ/bit, 802.15.6 NB-HBC and 4.93 pJ/bit, 400.9 MHz MedRadio Modes with 33.6% Transmit Efficiency,” *in IEEE Radio Frequency Integrated Circuits Symposium (**RFIC**)*
159. B. Chatterjee*, S. Sen, “A 41.5 pJ/b, 2.4GHz Digital-Friendly Orthogonally Tunable Transceiver SoC with 3-decades of Energy-Performance Scalability,” *in IEEE Custom Integrated Circuits Conference 2020 (**CICC**)*
160. D. Das* , J. Danial*, A. Golder, S. Ghosh, A. Raychowdhury, S. Sen, “Deep Learning Side-Channel Attack Resilient AES-256 using Current Domain Signature Attenuation in 65nm CMOS,” *in IEEE Custom Integrated Circuits Conference 2020 (**CICC**)*
161. S. Maity*, N. Modak*, D. Yang*, S. Avlani*, M. Nath*, J. Danial*, D. Das*, P. Mehrotra*, S. Sen, “A 415 nW Physically and Mathematically Secure Electro-Quasistatic HBC Node in 65nm CMOS for Authentication and Medical Applications,” *in IEEE Custom Integrated Circuits Conference 2020 (**CICC**)*
162. D. Das* , J. Danial*, A. Golder, N. Modak*, S. Maity*, B. Chatterjee*, D. Seo*, M. Chang, A. Varna, H. Krishnamurthy, S. Mathew, S. Ghosh, A. Raychowdhury, S. Sen, “EM and Power SCA-resilient AES-256 in 65nm CMOS through >350x Current Domain Signature Attenuation,” in *IEEE International Solid-State Circuits Conference 2020 (**ISSCC**)* --- ***Invited for Demonstration Session***
163. D. Das*, M. Nath*, B. Chatterjee*, S. Ghosh, and S. Sen, "STELLAR: A Generic EM Side-Channel Attack Protection through Ground-Up Root-cause Analysis," *in IEEE International Symposium on Hardware Oriented Security and Trust 2019 (**HOST**)* - ***Best Student Paper Award***
164. D. Das*, J. Danial*, A. Golder, S. Ghosh, A. Raychowdhury, and S. Sen, "X-DeepSCA: Cross-Device Deep Learning Side Channel Atack," *in ACM/IEEE Design Automation Conference 2019 (**DAC**)*

165. B. Chatterjee*, C. Mousoulis, S. Maity*, A. Kumar, S. Scott, D. Valentino, D. Peroulis, and S. Sen, " A Wearable Real-time CMOS Dosimeter with Integrated Zero-bias Floating Gate Sensor and an 861nW 18-bit Energy-Resolution Scalable Time-based Radiation to Digital Converter," *in IEEE Custom Integrated Circuits Conference 2019 (**CICC**) - presenting world's first monolithically integrated dosimeter –**Best Paper Award (Overall)***
166. S. Maity*, P. Mehrotra, B. Chatterjee*, and S. Sen, "An Improved Update Rate Baud Rate CDR for Integrating Human Body Communication Receiver," *in IEEE Biomedical Circuits and Systems Conference 2018 (**BioCAS**)*
167. S. Maity*, D. Yang, B. Chatterjee*, and S. Sen, "A Sub-nW Wake-Up Receiver for Human Body Communication," *in IEEE Biomedical Circuits and Systems Conference 2018 (**BioCAS**)*
168. S. Maity*, D. Das*, B. Chatterjee*, and S. Sen, "Characterization and Classification of Human Body Channel as a function of Excitation and Termination Modalities," *in IEEE Engineering in Medicine and Biology Conference 2018 (**EMBC**)*
169. D. Das*, S. Maity*, B. Chatterjee*, and S. Sen, "In-field Remote Fingerprint Authentication using Human Body Communication and On-Hub Analytics," *in IEEE Engineering in Medicine and Biology Conference 2018 (**EMBC**)*
170. B. Chatterjee*, D. Das* and S. Sen, "RF-PUF: IoT Security Enhancement through Authentication of Wireless Nodes using In-situ Machine Learning," *in IEEE International Symposium on Hardware Oriented Security and Trust (**HOST**) - **Best Poster Award** (3rd)*
171. S. Maity*, B. Chatterjee*, G. Chang* and S. Sen, "A 6.3pJ/b 30Mbps -30dB SIR-tolerant Broadband Interference-Robust Human Body Communication Transceiver using Time Domain Signal-Interference Separation," *in IEEE Custom Integrated Circuits Conference 2018 (**CICC**) - presenting world's lowest energy HBC transceiver*
172. G. Chang*, S. Maity*, B. Chatterjee* and S. Sen, "Design Considerations of a Sub-50 µW Receiver Front-end for Implantable Devices in MedRadio Band," *in IEEE International Conference of VLSI Design 2018 (VLSID)*
173. B. Chatterjee*, P. Panda, S. Maity*, K. Roy, and S. Sen, "An Energy-Efficient Mixed-Signal Neuron for Inherently Error-Resilient Neuromorphic Systems," *in IEEE International Conference on Rebooting Computing 2017 (**ICRC**)*
174. N. Cao, S. Sen, and A. Raychowdhury, "Collaborative Intelligence in Optical/IR Camera Based Wireless Sensor Nodes for HVAC Control," *in IEEE Sensors Conference, 2017 (**SENSORS**)*
175. S. Maity*, D. Das*, X. Jiang, and S. Sen, "Secure Human-Internet using Dynamic Human Body Communication" *in IEEE International Symposium on Low Power Electronics and Design 2017 (**ISLPED**)*
176. S. Maity*, D. Das*, and S. Sen, "Wearable Health Monitoring Using Capacitive Voltage-Mode Human Body Communication," *in IEEE Engineering in Medicine and Biology Conference 2017 (**EMBC**)*
177. M. Parsa, P. Panda, S. Sen, and K. Roy, "Staged Inference Using Conditional Deep Learning for Energy Efficient Real-Time Smart Diagnosis," *in IEEE Engineering in Medicine and Biology Conference 2017 (**EMBC**)*
178. D. Das*, S. Maity*, S.B. Nasir, S. Ghosh, A. Raychowdhury and S. Sen, "High Efficiency Power Side-Channel Attack Immunity using Noise Injection in Attenuated Signature Domain," *in IEEE International Symposium on Hardware Oriented Security and Trust 2017 (**HOST**) - **Best Student Paper Award***
179. N. Cao, S.B. Nasir, S. Sen, and A. Raychowdhury, "In-Sensor Analytics and Energy-Aware Self-Optimization in a Wireless Sensor Node," *in IEEE MTT International Microwave Symposium, 2017 (**IMS**)*
180. S. Maity, D. Das, and S. Sen, "Adaptive Interference Rejection in Human Body Communication using Variable Duty Cycle Integrating DDR Receiver," *in IEEE/ACM Design, Automation and Test in Europe 2017 (**DATE**)*
181. X. Jiang and S. Sen, "Secure, Energy-efficient, Interference-free Connectivity for Physiological Sensors using Interference-Robust Human Body Communication," in *IEEE National Aerospace & Electronics Conference (NAECON 2016) ---**Invited paper***
182. S. B. Nasir, S. Sen, and A. Raychowdhury, "A 130nm Hybrid Low Dropout Regulator Based on Switched Mode Control for Digital Load Circuits," in European Solid-State Circuits Conference *2016 (**ESSCIRC**)*

183. S. Sen, "SocialHBC: Social Networking and Secure Authentication using Interference-Robust Human Body Communication," in *IEEE International Symposium on Low Power Electronics and Design (**ISLPED**)*, Aug. 2016
184. S. Sen, "INVITED: Context-Aware Energy-Efficient Communication for IoT Sensor Nodes," in *ACM/IEEE Design Automation Conference 2016 (**DAC**)* ---***Invited paper***
185. C. Thakkar, S. Sen, J. Jaussi and B. Casper, "A 32Gb/s Bidirectional 4-Channel 4pJ/b Capacitively Coupled Link in 14nm CMOS for Proximity Communication," *IEEE International Solid-State Circuits Conference 2016 (**ISSCC**)* --- ***Invited for Demonstration Session***
186. D. Banerjee, S. Sen and A. Chatterjee, "Self learning analog/mixed-signal/RF systems: Dynamic adaptation to workload and environmental uncertainties," *IEEE International Conference on ComputerAided Design (ICCAD),* pp.59-64, 2-6 Nov. 2015 ---***Invited Paper***
187. S. Sen, "Channel-Adaptive Zero-Margin & Process-Adaptive Self-Healing Communication Circuits/Systems," *IEEE International Conference on ComputerAided Design (ICCAD),* pp.80-85, 2-6 Nov. 2014 ---***Invited*** *Special Sessions Paper*
188. D. Banerjee, B. Muldrey, X. Wang, S. Sen and A. Chatterjee, "Self-Learning MIMO-RF Receiver Systems: Process Resilient Real-Time Adaptation to Channel Conditions for Low Power Operation," *IEEE International Conference on ComputerAided Design* (*ICCAD*), pp.710-717, 2-6 Nov. 2014----***Best-in-Track Award***
189. A. Chatterjee, H. Wang, A. Banerjee, D. Banerjee, V. Natarajan, S. Sen and S. Devarakond, "Design of Self-Healing Mixed-Signal/RF Systems and Support CAD Tools: A Scalable Approach," *IEEE 57th International Midwest Symposium on Circuits and Systems (MWSCAS),* pp.1065-1068, 3-6 Aug. 2014 ---- ***Invited paper***
190. J. Jaussi, G. Balamurugan, S. Hyvonen, T. Hsueh, T. Musah, G. Keskin, S. Shekhar, J. Kennedy, S. Sen, R. Inti, M. Mansuri, M. Leddige, B. Horine, C. Roberts, R. Mooney and B. Casper, "A 205mW 32Gb/s 3-Tap FFE/6-tap DFE bidirectional serial link in 22nm CMOS," *IEEE International Solid-State Circuits Conference (**ISSCC**),* pp.440-441, 9-13 Feb. 2014
191. T. Hsueh, G. Balamurugan, J. Jaussi, S. Hyvonen, J. Kennedy, G. Keskin, T. Musah, S. Shekhar, R. Inti, S. Sen, M. Mansuri, C. Roberts and B. Casper, "A 25.6Gb/s Differential and DDR4/GDDR5 Dual-Mode Transmitter with Digital Clock Calibration in 22nm CMOS," *IEEE International Solid-State Circuits Conference (**ISSCC**),* pp.444-445, 9-13 Feb. 2014
192. J. W. Jeong and S. Ozev, S. Sen, V. Natarajan and M. Slamani, "Built-In-Self Test and Characterization of Polar Transmitter Parameters Through Loop-Back Mode," *IEEE/ACM Design, Automation and Test in Europe, (DATE),* pp.1-6, 24-28 March 2014
193. D. Banerjee, S. Devarakond, A. Banerjee, S. Sen and A. Chatterjee, "Real-Time Use-Aware Adaptive MIMO RF Receiver," *IEEE/ACM Design Automation Conference (**DAC**),* pp.1-7, May 29 2013-June 7 2013
194. J. W. Jeong, S. Ozev, S. Sen and T.M. Mak, "Measurement of Amplitude/Phase Path Delay Skew and Amplitude Path Bandwidth in Polar Transmitters," *31st IEEE VLSI Test Symposium (VTS),* pp.1-6, April 29 2013-May 2 2013 ---- ***Honorable Mention Award***
195. S. Devarakond, D. Banerjee, A. Banerjee, S. Sen and A. Chatterjee, "Efficient system-level testing and adaptive tuning of MIMO-OFDM wireless transmitters," *18th IEEE European Test Symposium (ETS),* pp.1-6, 27-30 May 2013
196. A. Chun, F. Sheikh, A. Khajeh, S. Sen and C. Tokunaga, "Joint AFE and Baseband Power-Performance Optimization for MIMO Detection," *Intel Circuits Technology Conference (ICTC), 2013*
197. D. Banerjee, S. Sen, S. Devarakond and A. Chatterjee, "Power Aware Post-Manufacture Tuning of MIMO Receiver Systems," *IEEE International Conference of VLSI Design (VLSI Design),* pp.143-148, 7-11 Jan. 2012
198. A. Banerjee, S. Devarakond, S. Sen, D. Banerjee and A. Chatterjee, "Testing of Digitally Assisted Adaptive Analog/RF Systems Using Tuning Knob - Performance Space Estimation," *IEEE European Test Symposium (ETS),* pp.1-1, 28-31 May 2012
199. A. Banerjee, S. Devarakond, S. Sen, D. Banerjee and A. Chatterjee, "Optimal Testing of Digitally Assisted Adaptive RF Systems," *IEEE International Mixed-Signals, Sensors and Systems Test Workshop (IMS3TW),* pp.46-51, 14-16 May 2012

200. S. Devarakond, D. Banerjee, A. Banerjee, S. Sen and A. Chatterjee, "DSP Driven Parallel EVM Testing of Embedded MIMO-OFDM RF Modules," *IEEE International Mixed-Signals, Sensors and Systems Test Workshop (IMS3TW)*, pp.40-45, 14-16 May 2012
201. D. Banerjee, S. Sen, A. Banerjee and A. Chatterjee, "Low-Power Adaptive RF Systems using Real-time Fuzzy Noise-Distortion Control," *IEEE International Symposium on Low Power Electronics and Design (**ISLPED**)*, pp. 249-254, Aug. 2012
202. A. Banerjee, S. Sen, S. Devarakond and A. Chatterjee, "Accurate Signature Driven Power Conscious Tuning of RF Systems Using Hierarchical Performance Models," *IEEE International Test Conference (**ITC**)*, pp.1-9, 20-22 Sept. 2011
203. S. Sen, M. Verhelst, and A. Chatterjee, "Orthogonally Tunable RF LNA for Adaptive Wireless Systems," *IEEE International Symposium on Circuits and Systems (ISCAS)*, pp.285-288, 15-18 May 2011
204. S. Sen, J. Natarajan, J. W. Wells and A. Chatterjee, "Mixed Signal System Level Cross Layer Adaptation for Variability and Workload," *IEEE International Mixed-Signals, Sensors and Systems Test Workshop (IMS3TW)*, pp.13-18, 16-18 May 2011
205. A. Banerjee, V. Natarajan, S. Sen and A. Chatterjee, "Optimized Multitone Test Stimulus Driven Diagnosis of RF Transceivers Using Model Parameter Estimation," *IEEE International Conference on VLSI Design*, pp.274-279, 2-7 Jan. 2011
206. A. Banerjee, S. Sen, V. Natarajan, S. Devarakond and A. Chatterjee, "Automatic Test Stimulus Generation for Accurate Diagnosis of Systems Using Transient Response Signatures.'" *29th VLSI Test Symposium (VTS)*, pp.58-63, 1-5 May 2011
207. J. Natarajan, S. Sen, and A. Chatterjee, "Real Time cross-layer Adaptation for Minimum Energy Wireless Image Transport using Bit Error Rate control," *IEEE International On-Line Testing Symposium 2011 (IOLTS)*, pp.127-132, 13-15 July 2011
208. A. Banerjee, S. Devarakond, V. Natarajan, S. Sen and A. Chatterjee, "Optimized Digital Compatible Pulse Sequences for Testing of RF Front End Modules," *IEEE International Mixed-Signals, Sensors and Systems Test Workshop (IMS3TW)*, pp.1-6, 7-9 June 2010
209. S. Sen, S. K. Devarakond, and A. Chatterjee, "DSP Assisted Low Cost IQ Mismatch Measurement and Compensation Using Built in Power Detector." *IEEE MTT International Microwave Symposium (**IMS**)*, pp.336-339, 23-28 May 2010
210. S. Sen, V. Natarajan, R. Senguttuvan and A. Chatterjee, "Design of Process and Environment Adaptive Ultra Low Power Wireless Front End Systems," *SRC TCHCON 2010.*
211. V. Natarajan, S. Sen, S. Devarakond and A. Chatterjee, "A Holistic Approach to Accurate Tuning of RF Systems for Large and Small Multi-Parameter Perturbations." *IEEE VLSI Test Symposium (VTS)*, pp.331-336, 19-22 April 2010
212. S. Devarakond, S. Sen, S. Bhattacharyya and A. Chatterjee, "Concurrent Process Model and Specification Cause-Effect Monitoring Using Alternate Diagnostic Signatures." *IEEE VLSI Test Symposium* (*VTS*), pp.337-342, 19-22 April 2010
213. S. Devarakond, S. Sen, V. Natarajan, A. Banerjee and A. Chatterjee, "Built-In Performance Monitoring of Mixed-Signal/RF Front Ends Using Real-Time Parameter Estimation," *16th IEEE International Online Test Symposium (IOLTS)*, pp.77-82, 5-7 July 2010
214. S. Sen, S. Devarakond and A. Chatterjee, "Rapid Radio Frequency Amplitude and Phase Distortion Measurement Using Single-tone AM Stimulus," *19th IEEE Asian Test Symposium 2010 (ATS)*, pp.277-282, 1-4 Dec. 2010
215. S. Devarakond, S. Sen, V. Natarajan, A. Banerjee, H. Choi, G. Srinivasan and A. Chatterjee, "Digitally Assisted Concurrent Built-In Tuning of RF Systems Using Hamming Distance Proportional Signatures," *19th IEEE Asian Test Symposium 2010 (ATS)*, pp.283-288, 1-4 Dec. 2010
216. S. Sen, S. K. Devarakond and A. Chatterjee, "Low Cost AM/AM and AM/PM Distortion Measurement Using Distortion-to-Amplitude Transformations." *40th IEEE International Test Conference (**ITC**)*, pp.1-10, 1-6 Nov. 2009 ---- ***Best student paper candidate***
217. A. Chatterjee, V. Natarajan, S. Devarakond, S. Sen, H. Choi, D. Han, R. Senguttuvan, S. Bhattacharyya and D. Lee, "Iterative Built-In Testing and Tuning of Mixed-Signal/RF Systems." *in 27th IEEE International Conference on Computer Design (ICCD)*, pp.319-326, 4-7 Oct. 2009 ---- ***Invited paper***

218. S. Devarakond, V. Natarajan, S. Sen and A. Chatterjee, "BIST-Assisted Power Aware Self-Healing RF Circuits," *IEEE International Mixed-Signals, Sensors and Systems Test Workshop (IMS3TW),* pp.1-4, 10-12 June 2009
219. S. Devarakond, S. Sen, and A. Chatterjee, "'Concurrent Low Cost Multi-Carrier Compensation of Amplitude and Phase distortions in RF Power Amplifiers," *10th Annual IEEE Wireless and Microwave Technology Conference (WAMICON),* pp.1-5, 20-21 April 2009
220. S. Devarakond, V. Natarajan, S. Sen, and A. Chatterjee, "Built-In Test Driven Power Aware Self Tuning of Wideband RF Devices," *14th IEEE European Test Symposium (ETS),* 2009
221. J. Natarajan, G. Kumar, S. Sen, M. M. Nisar, D. Lee and A. Chatterjee, "Aggressively Voltage Overscaled Adaptive RF Systems Using Error Control at the Bit and Symbol Levels," *15th IEEE International Online Test Symposium (IOLTS),* pp.249-254, 24-26 June 2009
222. V. Natarajan, S. Devarakond, S. Sen, and A. Chatterjee, "BIST Driven Power Conscious Post-Manufacture Tuning of Wireless Transceiver Systems Using Hardware-Iterated Gradient Search." *18th IEEE Asian Test Symposium 2009 (ATS),* pp.243-248, 23-26 Nov. 2009
223. S. K. Devarakond, S. Sen, and A. Chatterjee, "BIST Assisted Wideband Digital Compensation for MB-UWB Transmitters," *IEEE Symposium on Design and Diagnostics of Electronic Circuits and Systems (DDECS),* pp.84-89, 15-17 April 2009
224. V. Natarajan, S. K. Devarakond, S. Sen, and A. Chatterjee, "Power-Aware Self-healing of RF Transceiver Systems: Low-Cost Test Driven Simultaneous Tuning of Multiple Performance Metrics." *SRC TECHCON 2009.*
225. R. Senguttuvan, M. M. Nisar, S. Sen, V. Natarajan and A. Chatterjee, "End-to-End Test-Enabled Low-Power Adaptation for Wireless OFDM Systems," IEEE Workshop on Silicon Errors in Logic-System Effects (SELSE), 2008
226. S. Sen and A. Chatterjee, "Design of Process Variation Tolerant Radio Frequency Low Noise Amplifier" *21st IEEE International Symposium on Circuits and Systems (ISCAS),* pp.392-395, 18-21 May 2008
227. S. Sen, V. Natarajan, R. Senguttuvan and A. Chatterjee, "**Pro-VIZOR**: Process Tunable Virtually Zero Margin Low Power Adaptive RF for Wireless Systems," *ACM/IEEE 45th Design Automation Conference 2008 (**DAC**),* pp.492-497, 8-13 June 2008
228. S. Sen, R. Senguttuvan and A. Chatterjee, "Concurrent PAR and Power Amplifier Adaptation for Power Efficient Operation of WiMAX OFDM Transmitters" *IEEE Radio and Wireless Symposium (RWS),* pp.21-24, 22-24 Jan. 2008 ---- ***2nd Best Paper Award***
229. V. Natarajan, R. Senguttuvan, S. Sen and A. Chatterjee, " ACT: Adaptive Calibration Test for Performance Enhancement and Increased Testability of Wireless RF Front-ends," *IEEE VLSI Test Symposium (VTS), pp.215-220,* April 27 2008-May 1 2008
230. R. Senguttuvan, S. Sen and A. Chatterjee, "Concurrent Multi-Dimensional Adaptation for Low-Power RF in Wireless Devices" *21st IEEE International Conference on VLSI Design*, pp.65-70, 4-8 Jan. 2008
231. S. Sen, R. Senguttuvan and A. Chatterjee, "Feedback Driven Adaptive Power Management for Minimum Power Operation of Wireless Receivers" *IEEE International Conference on Electronics, Circuits and Systems (ICECS),* pp.1019-1022, 11-14 Dec. 2007
232. R. Senguttuvan, S. Sen and A. Chatterjee, "VIZOR: Virtually Zero Margin Adaptive RF for Ultra Low Power Wireless Communication," *IEEE International Conference on Computer Design (ICCD),* pp.580-586, 7-10 Oct. 2007
233. S. Akbay, S. Sen and A. Chatterjee, "Testing RF Components with Current Signatures," *16th IEEE Asian Test Symposium (ATS),* pp.393-398, 8-11 Oct. 2007
234. S. Sen, A. Dutta, S. Halder and T. K. Bhattacharyya, "A Common Gate Distributed Amplifier with 17 dB Gain, 10 GHz Bandwidth using Shunt Series Peaking Amplification," *IEEE International Conference on Ultra-Wide Band (ICUWB), 2007*
235. S. Sen, S. Narasimhan and A. Konar, "Species Classification Using DNA-Sequences by Self-Organizing Feature Map (SOFM)" *International Conference on Resource Utilization and Intelligent Systems* (*INCRUIS), 2006*
236. T. K. Bhattacharyya, S. Sen, D. Mandal and S.K. Lahiri, "Development of a Wireless Integrated Toxic and Explosive MEMS Based Gas Sensor," *19th IEEE International Conference on VLSI Design, pp.4 pp.-, 3-7 Jan. 2006*

237. S. Sen, A. Chatterjee, P. Bhattacharyya, S. Das, K. Basu, A. Pal and H. Saha, "Nanocrystalline MEMS Metal Oxide Gas sensors for Underground Coal mines" in *International Conference on Resource Utilization and Intelligent Systems (INCRUIS),* pp. 1-8, Jan. 4-6, 2006
238. P. Bhattacharyya, S. Sen, A. Chatterjee, S. Das, K. Basu, A. Pal and H. Saha "MEMS based Nanocrystalline Metal Oxide Gas Sensors for Coalmine Environment" in *International Conference on MEMS and Semiconductor Nanotechnology (MEMSNANO),* Dec. 20-22, 2005
239. S. Narasimhan, S. Sen and A. Konar, "Species Identification based on Mitochondrial Genomes," *International Conference of Cognition and Recognition (ICCR),* Dec. 2005
240. S. Sen, S. Narasimhan and A. Konar, "A Novel Algorithm for Automatic Species Identification" *1st International Conference on Pattern Recognition and Intelligent Systems, (PReMI),* pp 605-610, December 20-22, 2005
241. P. Bhattacharyya, S. Sen, A. Chatterjee and H. Saha, "Design of the Optimum Microheater for Smart MEMS Gas Sensor" *4th ISSS International Conference on Smart Materials, Structures and Systems (ISSS),* July 28-30, 2005
242. S. Narasimhan, S. Sen and A. Konar, "Application of Neural Networks to Biological Data Mining" *2nd Indian International Conference on Artificial Intelligence (IICAI)*, pp: 1507-1526, 2005
243. S. Sen, S. Narasimhan, A. Konar, U. K. Chakraborty, "Genomic Data Mining for Species Identification Using Principal Component Analysis," in *8th Joint Conference on Information Sciences (JCIS),* pp. 1299-1302, 2005

Invited Lectures and Tutorials

- **National/International Media, Television and Radio appearance**
  - ✓ **Live TV Interview on NASDAQ TradeTalks**
    - Invited interview hosted by Jill Malandrino on "10x-ing the Wearables Market With New Communication Technology: Wi-R" Jan 05, 2023 Interview Link, Twitter Post by NASDAQ, Jill Malandrino's post
  - ✓ **TEDx Indianapolis**
    - Invited Speaker on Body as a Wire (TED website): "How your body can play an integral role in wearable security" | Shreyas Sen | TEDxIndianapolis, Oct 24, 2019
  - ✓ **Freethink Hardreset**: Detailed Analysis and coverage of EQS-HBC Technology (Wi-R). The team from San Francisco visited Purdue and Ixana Office in West Lafayette with their team for analysis and filming. Video, Writeup.
  - ✓ **Purdue ECE Engineering Innovations**: Podcast Video
  - ✓ **Silicon Flatirons,** University of Colorado Boulder
    Invited Panel on **Radio layer vulnerabilities and Spectrum Policy** (Video)
    The conference featured keynotes by Julius Knapp, Chief of the Federal Communications Commission's Office of Engineering and Technology, and Dr. Lisa Porter, Deputy Under Secretary of Defense for Research and Engineering, who oversees the U.S. Department of Defense's work on 5G security. The panel discussions focuseed on the health care industry, cellular communications, along with next steps and solutions in this area.
    https://siliconflatirons.org/events/saving-our-spectrum-handling-radio-layer-vulnerabilities-in-wireless-systems/
  - ✓ Appearance on **Indian National TV CNBC TV18 Young Turks Program**
    https://engineering.purdue.edu/~shreyas/SparcLab/home/media.html
  - ✓ **Radio Interview on HBC: NPR** subsidiary Lakeshore Public Radio published excerpts of Radio Interview on Purdue Human Body Communication Technology. Listen Here.
- **Panelist**
  - ✓ Panelist, Trials and Triumphs, 2023 Rally Innovation Conference, Indianapolis, IN Aug 29, 2023
  - ✓ Purdue Graduate Showcase BioMedical Panel, Oct 04, 2021

- ✓ "**Disrupting Point of Care Diagnostics,"** Invited Talk as a Panelist **BioCrossroads Frameworx**, Virtual Event, May 27, 2020 Online Talk
- ✓ "**Security and Safety Challenges in Automotive",** in IEEE Interneational Test Conference, Automotive Reliability and Test Workshop (**ITC ART 2019**), Wanghinton DC, 14th November 2019
    - Oranizer: Giorgio Di Natale (TIMA), Moderator: Rob Aitken (ARM), Co-Panelists: Nir Maor (Qualcomm), Sandip Ray (University of Florida), Francesco Regazzoni (AlaRI), Daniel Tille (Infineon Technologies)
- ✓ "**Security Threats in the Analog / RF Domain: An Academic Perspective**" in TxACE Workshop on Secure and Trusted Analog/RF Systems (**TxACE STARS 2018**)
    - Co-Panelists: Ioannis Savidis, Drexel University, Kaiyuan Yang, Rice University. Moderator: Swaroop Ghosh, Pennsylvania State University
- ✓ "**AI, Cognitive Information Processing, and Rebooting Computing**" in IEEE International Conference on Rebooting Computing (ICRC 2017)
    - Co-Panelists: Stan Williams, HPE, Tom Conte, Georgia Tech, Trung Tran, Booz-Allen. Organizer: David Mountain, DoD

- **Invited Lectures & Tutorials**

1. "Circuits and Systems for Ultra-low-Power and Secure Human-Body Communication (HBC) for the Next-generation of Intelligent Wearables and Implants" Invited Tutorial in **VLSID** Bangalore, India, Jan 04, 2025
2. "Electro-Quasistatic Body and Brain Communication Circuit Model for Efficient and Secure Internet of Bodies," Invited Tutorial at IEEE Biomedical Circuits and Systems Conference (**BioCAS**), Oct 24, 2024
3. **IEEE SSCS Distinguished Lecture:** "Secure and Efficient Internet of Bodies using Electro-Quasistatic Human Body Communication" at **City University of Hong Kong**, Hong Kong, Oct 21, 2024
4. "Your Body: A Data Wire" at **BITS Pilani**, virtual, Sep 27, 2024
5. **IEEE SSCS Distinguished Lecture:** "Secure and Efficient Internet of Bodies using Electro-Quasistatic Human Body Communication" at SSCS Oregon Chapter, Intel Labs, Hillsboro, Oregon, Jul 19, 2024
6. **DAC Invited Talk:** "Human-Inspired Distributed Wearable AI" at Design Automation Conference (DAC), Jun 26, 2024
7. "Human-Inspired Distributed Wearable AI using IoB," at ECE Graduate Seminar, **University of Pittsburg**, Nov 06, 2024
8. **ISSCC Invited Tutorial:** "Recent Advances in Circuit-Techniques for Resilience to Side-Channel Attacks" at IEEE International Solid-State Circuits Conference (ISSCC), Feb 18, 2024 – *Top tutorial, further Invited for SSCS Magazine article*
9. "Internet of Bodies for seamless Human-Machine Co-operation and Real-time AI," at Indian Institute of Science (**IISC**) Bangalore, India, Jan 15, 2024
10. "Recent Advances in Electro-Magnetic Hardware Security and Physical-layer Generic Countermeasures," **NSF UK-US Semiconductor Security** Workshop, Security in the Era of Global Semiconductor Initiatives, Washington, DC, Nov 28, 2023
11. "The Vision of the Internet of Bodies (IoB)," in IEEE 66th International Midwest Symposium on Circuits and Systems (**MWSCAS**) Aug 8, 2023
12. **Keynote:** "Securing the Internet of Bodies using Human Body as a 'Wire'" at W03 Workshop on Nano Security: From Nano-Electronics to Secure Systems, IEEE Design, Automation and Test in Europe Conference (**DATE**), April 18, 2023

13. "Secure and Efficient Internet of Bodies (IoB) using Body as a 'Wire'," in Forum 7: Advanced Circuits and Technologies for Wearable and Implantable Devices at **IEEE International Solid-State Circuits Conference** (**ISSCC**) Feb 23, 2023
14. "Secure and Efficient Internet of Bodies (IoB) using Body as a 'Wire'," invited talk and visit **University of Southern California (USC),** LA, Sep 23, 2022
15. "Understanding the Photonic & EM Side-Channel: Theory, Attacks and Generic Defense," in Resilient Architectures and Robust Electronics **(RARE) Center** Kickoff Meeting, hosted by **Intel Labs., Intel Corporation**, Hillsboro, OR, Sep 13, 2022
16. "Secure and Efficient Internet of Bodies (IoB) using Body as a 'Wire'," in WSO: Human Body Communications at **IEEE Radio Frequency Integrated Circuits Symposium** (**RFIC**) June 19, 2022
17. "Secure and Efficient Internet of Bodies (IoB) using Body as a 'Wire' invited talk and visit at **Jadavpur University,** Kolkata, India, July 18, 2022
18. "Secure and Efficient Internet of Bodies (IoB) using Body as a 'Wire' invited talk and visit at **Indian Institute of Technology, Kharagpur (IITKgp),** Kharagpur, India, July 15, 2022
19. "Secure and Efficient Internet of Bodies (IoB) using Body as a 'Wire'," invited talk at Symposium on Photonics, Electromagnetics & Electronic Devices (SPEED) 2022 on the occasion of the 75th anniversary of the Department of Electrical Communication Engineering (ECE) at **Indian Institute of Science** (**IISC**), Bangalore, India, July 12, 2022
20. "Secure and Efficient Internet of Bodies (IoB)" in Solid State Circuits Seminar Series, invited talk and visit University of **Notre Dame,** Indiana, Jan 28, 2022
21. "RF-PUF/Fingerprinting & SparcLab RF-PUF Dataset," in **Mini Research Workshop on RF Fingerprint,** hosted by **Intel Labs**., Hillsboro , OR Dec 2, 2021
22. "Recent Advances in Circuit-level Techniques to Kill the EM Side Channel Leakage at Its Source," at *IEEE International Conference on PHYSICAL ASSURANCE and INSPECTION of ELECTRONICS (**PAINE**), Wasington, DC* - Virtual Event, Nov 16, 2021
23. "Understanding the Photonic Side-Channel: Theory, Attacks and Generic Defense," in **Resilient Architectures and Robust Electronics (RARE) Center Kickoff Meeting,** hosted by **Intel Labs**., Hillsboro, OR, Nov 15, 2021
24. "Low-Overhead Generic Countermeasures against EM & Power Side-Channel Attacks," in **Side Channel Academic Program (SCAP) Workshop,** hosted by **Intel Labs**., Hillsboro, OR Nov 2, 2021
25. "Physically-Secure Low-Power Human State Measurement using EQS-HBC and Edge-Analytics," Invited Talk at in IEEE Research and Applications of Photonics in Defense Conference (**RAPID**), Aug 03, 2021
26. "Recent Advances in Electro-Magnetic Hardware Security and Physical-layer Generic Countermeasures," in **MEST** Center Tutorial Series, July 07, 2021
27. "STELLAR+: A Low-Overhead Generic Countermeasure for EM/Power Side-Channel Attacks," **Intrisix Corp.,** Jun 23, 2021
28. "Human State Measurement in RF-denied environment using Body as a Wire," Air Force Research Lab (**AFRL**), Dayton, OH, Jun 09, 2021
29. "Secure and Efficient Internet of Body (IoB) leveraging Human Body as a Wire," CRISP Center Seminar, Feb 24, 2021
30. "Secure and Efficient Internet of Body (IoB) leveraging Human Body as a Wire and Physical Security," **University of Chicago (UIC),** Feb 19, 2021

31. "Electromagnetic and Machine Learning Side-Channel Attacks and Low-overhead Generic Countermeasures," at *IEEE Symposium on Hardware Oriented Security and Trust* (**HOST 2020**), Virtual Event, Dec 7, 2020
32. "Flexible Battery-Free Sensor Nodes For The Internet Of Body," in **Vaibhab Summit organized by Govt. of India,** a premier event on the future of Science & Technology. Electronics and Semiconductors Technologies (EST), Oct 21, 2020
33. "Low-Overhead Generic Countermeasures against EM & Power Side-Channel Attacks," **Plenary Talk**, in Intel Side Channel Academic Program - 2nd Annual Workshop, Sep 28, 2020
34. "The Journey of the Invention and Impact Of Body-As-A-Wire Technology & Mentoring Undergraduates In The Process", **Purdue College of Engineering (CoE) Celebrating Our Associate Professors**, Sep 25, 2020
35. "Electro-Quasistatic Human Body Communication for the Future of the Internet of Body," Electronics and Electrical Communication Engg. – Indian Institute of Technology, Kharagpur (**IIT Kharagpur**), Aug 22, 2020
36. "Electro-Quasistatic Human Body Communication for the Future of the Internet of Body," Purdue ECE Seminar, Jun 25, 2020
37. "Short Course: Devices for IoT – Device Opportunities in the Emerging Era of Internet of Things," Talk on "Internet of Things: Sensor Nodes," at Device Research Conference (**DRC 2020**), Jun 21
38. "Secure and Efficient Internet of Body (IoB) - for Engineering the Future of Health" in Wearable Technologies in **CTSI Retreat** at Purdue, Jan 31, 2020, West Lafayette, IN, USA
39. "Advances in Power Management for Secure IoT and Efficient Mobile Applications," Invited Tutorial Talk in *IEEE International Conference on VLSI Design* (**VLSID 2020**), Bangalore, India, January 4, 2020
40. "Secure and Efficient Internet of Body (IoB)," in 1st Warren B. Nelms Annual IoT Conference, **Signature Talk**, Dec 3, 2019, Gainsville, FL, USA
41. "Electromagnetic and Machine Learning Side-Channel Attacks and Low-overhead Generic Countermeasures," at *IACR Conference on Cryptographic Hardware and Embedded Systems* (**CHES 2019**), Atlanta, GA, August 25, 2019
42. "Context-Aware Adaptation of Communication and Analytics in Resource-constrained Intelligent Edge Nodes," **DARPA** Electronics Resurgence Initiative (**ERI**)-**Edge-Intelligence** Workshop, July 17th 2019
43. "Deep Dive on Low-Overhead Generic Countermeasures against EM & Power Side-Channel Attacks," **Intel Labs**, Hillsboro, Oregon, June 12th 2019
44. "Low-Overhead Generic Countermeasures against EM & Power Side-Channel Attacks," Intel Side Channel Academic Program, 1st Year Review, **Intel Corp.**, Hillsboro, Oregon, June 11th 2019
45. "Secure, Energy-Efficient IoT Sensor Nodes with Edge-Analytics," SmartFilms Industry Day, Purdue, May 15th 2019
46. "Design for Security and Trust," Engineering Faculty Conversation on Trusted Systems and Information, Purdue University, April 25th 2019
47. "Electro-Quasistatic Human Body Communication: From Physics to Broadband IC and Applications," IEEE Custom Integrated Circuits Conference (**CICC 2019**), Forum-New Paradigm in Miniaturized Electronics-Wearables and Neural Interfaces, April 15, 2019
48. "Secure, Efficient 'Internet of Body' using Human Body Communication and In-Sensor Analytics," **ARM** Austin, April 16, 2019
49. "Resource-Constrained Intelligence at the Connected Edge," IU AFRL 2030, May 10, 2018 – as a part of US **Airfore Research Lab 2030** vission planning workshop at Indiana University, Bloomington, Indiana, USA

50. "Securing EM Side-Channels through Generic LowOverhead Physical Countermeasures," **Intel Labs**, Hillsboro, Oregon, April 20, 2018
51. "Secure Internet of Body (IoB) using Human Body Communication and In-Sensor Analytics," at CPS IoT Forum, Purdue University, April 2, 2018
52. "Secure Efficient Human Body Network using Subcutaneous Transport," at EMTech India 2018 (organized by MIT Technology Review and Livemint), Gurgaon, Delhi India – **MIT TR35 India Award Reception Speech,** March 9, 2018
53. "Secure Human Centered Network of Intelligent Devices using Human Body Communication and In-Sensor Analytics", at Birck Faculty Seminar, February 15, 2018
54. "Secure Human Centered Network of Intelligent Devices using Human Body Communication," at Indian Institute of technology, Bombay (IITB), India, January 11, 2018
55. "Staged Inference Using Conditional Deep Learning and Human Body Communication for Smart Diagnosis," Tata Consultancy Services (TCS) Innovation Labs, Kolkata, India, January 3, 2018
56. "Design and Test Needs for Adaptive IoT Sensor Nodes," at IEEE European Test Symposium (ETS), Limassol, Cyprus, May 23, 2017.
57. "Context-Aware Self-Optimizing IoT Sensor Nodes," at IEEE VLSI Test Symposium (VTS), Las Vegas, USA, April 10, 2017.
58. "Context-aware, ultra-low power, energy harvested IoT sensor nodes" at IEEE Sensors Conference, Orlando, USA, October 30, 2016.
59. "Neuromorphic Computing in CMOS: Digital, Analog, or Mixed-Signal?", **US-Korea Forum on Nanotechnology**, organized by National Science Foundation (NSF, USA) and Ministry of Science, ICT & Future Planning (Korea), Seoul, Korea, September 27, 2016.
60. "Secure, Energy-efficient, Interference-Robust Connectivity of Physiological Sensors using Human Body Communication," Invited to speak in session "CMOS Electronics and Sensor Microsystems" as part of the IEEE National Aerospace and Electronics Conference (NAECON), supported by Air Force Institute of Technology (AFIT), Dayton, OH, July 28, 2016
61. "Context-Adaptive and Energy-Efficient Communication for IoT Sensor Nodes" - Invited Special Session Talk at ACM/IEEE **Design Automation Conference (DAC)**, June 8, 2016
62. "Self-learning Context-Adaptive Communication Circuits/Systems", School of Electrical and Computer Engineering (ECE), Purdue University, West Lafayette, IN, April 6, 2015
63. "Context-Adaptive Communication Circuits/Systems", Advanced Radio Integration Research Lab, Intel Labs, Hillsboro, OR, Jan 2015
64. "Context-Adaptive Communication Systems - A solution to the energy-gap for a smart connected world?" Invited Talk at Electrical Engineering, Stanford University, Palo Alto, CA, November 20, 2014
65. "Channel-Adaptive Zero-Margin & Process-Adaptive Self-Healing Communication Circuits/Systems", Invited Tutorial Talk at *IEEE International Conference on Computer Aided Design* (**ICCAD 2014**), San Jose, CA, November 3, 2014
66. "Environment and Process Adaptive Low-Power Wireless & High-Speed Circuits and Systems", Circuit Research Lab, Intel Labs, Hillsboro, OR, August 9, 2011
67. "Environment and Process Adaptive Low Power Wireless Circuits and Systems", Radio Integration Research, Intel Labs, Hillsboro, OR, November 2, 2010

Patents:

1. L. Ding, S. Sen, “Body identification (BodyID) system” Non-provisional Filing, OTC Disclosure
2. L. Ding, S. Sen, “Clockless Human Body Communication Wake Up Receiver and Clock Generation” Non-provisional Filing, OTC Disclosure
3. S. Sen, L. Ding, “Series Resonant Capacitive Electro-Quasistatic Human Body Powering” Non-provisional Filing, OTC Disclosure
4. S. Sen, L. Ding, “Capacitive Electro-Quasistatic Human Body Powering” Non-provisional Filing, OTC Disclosure
5. A. Choudhary, S. Maity, S. Sen, “Communication system for simultaneous interference cancellation, supply and ground noise rejection using human body” - Non-provisional filed
6. S. Dey, S. Maity, S. Sen, S. K. Bose, “A communication system and method for error-proportional energy saving in encoding and decoding in body area networks using human body communication” - Non-provisional filed
7. S. Sen, A. Roy, “A communication system and method for spread spectrum and multiple access in body area networks using human body communication” Non-provisional Filing
8. S. Sen, M. A. Khater, S. Islam, S. Maity, D. Yang, “Quasistatic and resonant communication system and method through a display chassis” - Non-provisional Filing
9. S. Sen, S. Sarkar, D. Yang, “Communication system for augmented human-object interaction” - Non-provisional Filing
10. D. Yang, S. Sen, S. Maity, “System and method for providing communication between devices of vehicle using intra-vehicular network” - Non-provisional Filing
11. A. Roy, S. Sen, S. Maity, “Method and system for pulse shaping of baseband signals in communication networks using electroquasisatic signals” - Non-provisional Filing
12. S. Sen, A. Datta, “A system and method for touch-based data communication using human body” - Non-provisional Filing
13. S. Sen, A. Datta, D. Lingke “Machine to wearable power transfer system and method for powering wearable devices through a human body” - Non-provisional Filing
14. S. Sen, S. Sarkar, “A Communication system for data transfer using human body resonance” - Non-provisional Filing
15. T. Swan, S. Maity, S. Sen, “Synchronized TDMA network, with body communicated signals to achieve low latency and low power “ - Filed
16. S. Sen, K. Polachan, M. R. Chowdhury, S. Shaw, S. Weigand, Y. Xie, D. Yang, “Electro-Quasistatic Human-Body Communication for Perpetual Monitoring of Vital Signs using Flexible On-Body ECG Sensing Patch Powered from Body Heat” – Patent Filed by Eli Lilly
17. S. Sen, G. K. K., A. Ghosh, “Energy-Efficient Approximate Digital JPEG And MJPEG-Compression Method,” Approved for Provisional Filing
18. S. Sen, G. K. K, “Direct Analog To JPEG Compression Method,” Approved for Provisional Filing
19. S. Sen, B. Chatterjee, “Adiabatic Communication And Combinatorial Pulse-Position Modulation Method And Device,” Provisional Patent Filed
20. S. Sen, B. Chatterjee, M. Nath, A. Datta, “Galvanic Electro-Quasistatic Wearable To Implantable Communication For A Smart Contact Lens,” Provisional Patent Filed
21. S. Sen, M. Nath, A. Datta, “Resonant Magneto Quasistatic Wearable To Implantable Communication And Powering For A Smart Contact Lens,” Provisional Patent Filed

22. B. Chatterjee, M. Nath, S. Sen, “Bidirectional Neural Transceiver and Stimulator Using Bi-Phasic Quasi-Static Brain Communication Targeted Towards Untethered Brain-Machine Interfaces” Purdue Office of Technology Commercialization, Provisional Patent Filed
23. S. Sen, S. Maity, “Selective Communication Strictly During Touch for Human Computer Interaction Using Human Body Communication,” Purdue Office of Technology Commercialization, Filed.
24. S. Sen, “Wearable Health Monitoring System And Method Using Human Body Communication,” Purdue Office of Technology Commercialization, Filed: May 14, 2019, US 16412409
25. S. Sen, S. Maity, “System and method for signal interference rejection using human body communication,” Issued: Apr 15, 2021 US11374602 (Priority Date: 2019-07-22)
26. S. Sen, “Human body communication interference rejection system,” Purdue Office of Technology Commercialization, Issued: Dec 12, 2019 US-2019-0379414-A1 (Priority Date: 2018-03-07)
27. F. Sheikh, A. Whitcombe, Y. Wang, E. Alpman and S. Sen, " Digital intensive hybrid ADC/filter for LNA-free adaptive radio front-ends”, Intel Corporation, US Pat. No. US9584164B1, Filed: Feb 22, 2016 Issued: Feb 28, 2017.
28. S. Sen, R. Bhat, Y. Wang, S. Pellerano, C. Hull and F. Sheikh, "Real-time blocker-adaptive broadband wireless receiver for low-power operation under co-existence in 5G and beyond”, Intel Corporation, US Pat. No. US20170187405A1, Filed: Dec 23, 2015 Issued: Jun 29, 2017
29. S. Sen, C. Thakkar, J. Jaussi and B. Casper, “Techniques for device-to-device communications”, Intel Corporation, US Pat. No. US20160285513A1, Filed: March 25, 2015 Issued: Sep 29, 2016
30. J. Jaussi, B. Casper, S. Sen and C. Thakkar, "Proximity Capacitive Coupling for Board-to-Board Wide Bandwidth Transmissions”, Intel Corporation, US Pat. No. US20150340814A1, Filed: May 23, 2014 Issued: Nov 26, 2015
31. S. Sen and A. Chatterjee, “Amplifier having orthogonal tuning elements”, Georgia Tech Research Corporation, US Pat. No. US9548705B2, Filed: March 14, 2013 Issued: Jan 17, 2017
32. S. Sen, S. Devarakond and A. Chatterjee, “Systems and Methods for Distortion Measurement using Distortion-to-Amplitude Transformations”, Georgia Tech Research Corporation, US Pat. No. US 8358169 B2, Filed: Nov 01, 2010 Issued: Jan 22, 2013
33. A. Chatterjee, S. Sen, V. Natarajan and S. Devarakond, “Power Conscious Self-Healing transceiver systems and methods” Georgia Tech Research Corporation, US Pat. No. US8983390B2, Filed: May 17, 2011 Issued: May 24, 2012
34. S. Sen, S. Devarakond and A. Chatterjee, “Systems and methods for measuring I-Q mismatch”, Georgia Tech Research Corporation, US Pat. No. US 8526533B2, Filed: May 24, 2011 Issued: April 04, 2017
35. H. Muthali and S. Sen, “Wideband Jammer Detector” Qualcomm Inc, US. Pat. No. US8838017B2 Filed: Oct 20, 2009, Issued: Sep 16, 2014. Also published as EP2415166B1, WO2010120562A2, KR101367882B1, TW201126896A, CN102369663B, JP5502989B2 in respective countries
36. S. Sen, A. Chatterjee and R. Senguttuvan, “Methodology for Designing Environment Adaptive Ultra Low Power Wireless Communication Systems & Methods”. Georgia Tech Research Corporation US Patent no. US 8059571B2, Filed: March 1, 2008, Issued: Nov 15, 2011
37. S Sen, B Chatterjee and M Nath “Bi-phasic quasi-static brain communication device and method,” in Patent office, 2024