PAUL D. FRANZON

Cirrus Logic Distinguished Professor
Director of Graduate Programs
Department of Electrical and Computer Engineering

I. INTRODUCTION

B. BRIEF RESUME

1. Education

- Doctor of Philosophy, Electrical and Electronic Engineering 1989, University of Adelaide, Australia . Advisor: Kamran Eshraghian.
- Bachelor of Engineering with First Class Honours, Electrical and Electronic Engineering: 1984, University of Adelaide, Australia
- Bachelor of Science, Physics and Mathematics: 1983, University of Adelaide, Australia.

2. Professional Experience

- Assistant Professor, Associate Professor, Professor, and Distinguished Professor North Carolina State University, Department of Electrical and Computer Engineering, Raleigh, North Carolina, January 1989 – present
- Technical Director, Rambus (part time/consulting), 2009-11, Chapel Hill, NC.
- Cofounder, LightSpin Technologies Inc., 2001-. Vice-President of Engineering, 2001-2002, Raleigh NC.
- PhD Candidate, University of Adelaide, Department of Electrical and Electronic Engineering, Adelaide, South Australia, Australia, April 1987 - December 1988.
- Director and Co-Founder, Network Communications Pty. Ltd., Adelaide, South Australia, Australia, April 1987 - April 1989.
- Consultant, AT&T Bell Laboratories, Holmdel NJ, January 1986 - April 1987.
- PhD Candidate, University of Adelaide, Department of Electrical and Electronic Engineering, Adelaide, South Australia, Australia, August 1984-December 1985.
- Engineer, Defence Science and Technology Organization, Salisbury, South Australia, Australia, January 1984--July 1984
- Intern, Defense Science and Technology Organization, Salisbury, South Australia, Australia, December 1982--March 1983.
- Intern, Telecom Australia, Adelaide, South Australia, Australia, December 1981-March 1982.
- Infantry Soldier and Officer, (Ranks held: Private - Captain), Royal Australian Infantry Corps, Australian Army Reserve, December 1979 - December 1991.

3. Scholarly and Creative activities

Petitioner Samsung Ex-1003, 0001

Type	*Number*
Books	4
Solution Manuals	1
Edited Book Chapter	19
Refereed Journal article	99
Conference Paper (refereed)	237
Patents granted	10

4. Membership in professional organizations

Fellow, Institute of Electrical and Electronic Engineers
Member, IMAPS
Member, SPIE
Member, Association of Computing Machinery

5. Scholarly and professional honors

- Alumni Distinguished Graduate Professor Award, 2021
- NCSU Innovator of the Year Award, 2015
- College of Engineering Board of Governor's Award, 2014
- NRL Alan Berman Research Publication Award, 2008
- Babbage Award, Synopsys, 2008
- Fellow of the IEEE, 2006
- Alcoa Research Award, 2005
- ECE Graduate Teacher of the year award, 2007
- ECE Most Helpful Teacher of the year award, 2007
- ECE Teacher of the year award, 2006
- ECE Graduate Advisor of the year award, 2006
- Alumni Undergraduate Distinguished Professor, 2003-2005.
- Graduate teacher of the year, ECE department, 2005
- NSW Australia Expatriate Scientist Award, 2003
- Selected to the NCSU Academy of Outstanding Teachers, 2001
- First round prize winner, SRC copper challenge, 2000.
- Teacher of the Year Award, presented by the IEEE Student Branch, 1997
- National Science Foundation Young Investigator's Award, 1993.
- 13 prizes while a student at the University of Adelaide
- Australia Defense Medal, 2006

6. Professional service on campus

- Member, STRAG 2003-2005
- Instructor, PE preparation course 1995-2000

7. Professional service off campus

Petitioner Samsung Ex-1003, 0002

- Consultant to Perkins Cole, 2022, patent issues
- Consultant to Micross, 2022, 3DIC processes
- Consultant to DLA Piper, 2022, patent issues
- Consultant to Wolf Greenfield, 2022, patent issues
- Consultant to Lee Hayes, 2020-, patent issues
- Consultant to Fish and Richardson, 2020-22, patent issues
- Consultant to Sofwerx, 2018, Machine learning for UAVs.
- Consultant to Kirkland, 2019- patent issues
- Consultant to Finnigan, 2016-, patent issues
- Consultant to Wilmar, 2017-, patent issues
- Consultant to Unified Patents, 2017- , patent issues
- Consultant to DARPA, Thermal issues, 2012-2016
- Consultant to Paul Hastings, OMM, KL Gates, Samsung, Micron and SK Hynix, 2015-,2017 Patent issues
- Consultant to LDKM and AVT, Patent issues, 2013-2015
- Consultant to Skiermont Puckett and Spherix, Patent issues, 2014-2016
- Consultant to Haliburton, 2014
- Consultant to DARPA, Exascale Computing Study, 2007-9.
- Consultant to Rambus, Semiconductors, 2009-12
- Consultant to Techsearch, 2008.
- Consultant, NTU, 2004-9. ASIC Design.
- Consultant to Tessera, 2009. 3DIC advising.
- Consultant, Irvine Sensors, 2006. Secure chip design.
- Consultant, Cisco Systems, 2006, Signal Integrity.
- Consultant, Talon Logic, 2005. Secure system Design.
- Consultant to O'Malveny and Meyers, 2000-2002, Patent issues.
- Consultant to Venture 2000, 2000, Due Diligance.
- Consultant to CAPPS, 1999-2000, IP Development.
- Consultant to Sofrent, 1999-2000, IP Development.
- Consultant to Ericsson, 1997, Synthesis Methodology.
- Consultant to Cadence, 1996. Evaluated possible company acquisition.
- Consultant to Polychip, 1994 - 2000. Circuit Design.
- Consultant to Square-D, 1996. Interconnect Design.
- Consultant to Mentor Graphics, 1995, 1996. Technical advisory board.
- Consultant to Cadence Design Systems, 1992, 1996. Technical advisory board.
- Consultant to DCT, 1995-1996. ASIC Design.
- Consultant to Techsearch International, 1989-1991. Report Preparation.
- Consultant to BNR, HP, Sun. 1992-4. Interconnect Design.
- Consultant to MCNC, 1989. CAD

C. CANDIDATES STATEMENT

As **Director of Graduate Programs in ECE** (starting in 2016), I have introduced the following innovations:

Petitioner Samsung Ex-1003, 0003

1. I led the faculty in agreeing to a reduced course load for our PhD students (from 42 CH to 30 and simplified rules). This has been very popular with PhD students. (2016)
2. I introduced a PhD Visit Day and held one every year. The ones held in 2017 and 2018 each involved over 40 visitors and about the same number of alumni, faculty and current students. Over 90% of students surveyed stated they are more likely to come as a result of the visit day.
3. I reorganized an office into 3 staff and 1 EPA position. The 3 staff consist of two GSSCs (one for admissions and one for current students), and one assistant for both. The EPA position is our new Director of Graduate Employment Services. Her role is to help students get jobs and internships.
4. I introduced a series of panels aimed at PhD students. Panels held so far include the following
    a. Becoming faculty (2017);
    b. Becoming an industry researcher (2018);
    c. Writing proposals (2019).
5. I held two classes on advanced study skills aimed at MS students (2018).
6. I took over leadership of the Graduate Admissions Committee. We reorganized the PhD recruiting flow, starting from information disseminated by the Admissions GSSC through to TA allocations. I reorganized the MS admissions flow, starting from data prep by the Admissions GSSC to using statistical models to assist (not make) the decision making process.
7. I changed the PhD application process to encourage students to answer questions specifical to what they can draw upon to make good PhD students.
8. I redid our marketing materials and started marketing at other campuses in the UNC system.
9. I conducted surveys of current students, and alumni to determine gaps in our program. As a result, I introduced additional courses in verification with UVM, operating systems and hardware security. In addition the Neural Networks course was refocused and a concentration on Machine Learning introduced.
10. Introduced Graduate Certificates in 5G, ASIC Design and Verification, CPE and EE.

As **Site Director for the Center for Advanced Electronics through Machine Learning** (CAEML) I lead this Center for NCSU. I am one of the founding directors for this Center, which is run jointly with UIUC and Ga Tech. I am responsible for member company recruiting, faculty recruiting and running the biannual meetings as held every 18 months on campus here. I have particularly focused on drawing in other NCSU faculty to the Center. Two new faculty have joined since the center started.

Petitioner Samsung Ex-1003, 0004

II. TEACHING AND MENTORING OF UNDERGRADUATE AND GRADUATE STUDENTS

A. TEACHING EFFECTIVENESS

1. Courses Taught

Since becoming DGP, I am not required to teach, though I did teach ECE 464/564 in 2016, 17 and 19. I continue to remain involved in ECE 464/564 and ECE 733 though by giving guest and substitute lectures, advising on course policies, content and suggesting suitable class projects.

Course	When	Enrollment	Instructor effectiveness	Course excellence
ECE 464 ASIC Design	F 21	41	na	na
ECE 564 ASIC Design	F 21	157	na	na
ECE 564-601	F 21	7	5.0/4.3	4.7/4.1
ECE 564-640	F 21	11	4.8	4.3
ECE 564-651	Sum 21	9	4.3/3.8	4.2/3.8
ECE 464 ASIC Design	F 20	39		
ECE 564 ASIC Design	F 20	54		
ECE 564-601	F 20	10	4.2	4.6
ECE 564-651	Sum 20	16	4.3	4.0
ECE 464-001	F 19	39	4.7	4.5
ECE 564-001	F 19	139	4.7	4.5
ECE 564-601	F 19	6	5.0	5.0
ECE 464-001	F 17	36	4.4	4.4
ECE 564-001	F 17	148	4.4	4.4
ECE 564-601	F 17	7		
ECE 464-001	F 16	29	4.8	4.6
ECE 520-001	F 16	121	4.8	4.8
ECE 520-601	F 16	9	4.4	4.2
ECE 520-651	Su 16	16	4.6	4.6
ECE 464-001	S 15	19	4.3	4.3
ECE 520-001	S 15	119	4.3	4.3
ECE 520-601	S 15	11	4.8	5.0
ECE 520-603	S 15	3		
ECE 520-651	SuI 15	16	4.6	4.6
ECE 733-001	S 15	50	4.5	4.3
ECE 464-002	F 15	21	4.6	4.5
ECE 520-002	F 15	129	4.6	4.5
ECE 520-601	F 15	7	5.0	5.0
ECE 634-602 ASIC Design	F 2014	6		
ECE 634-602 ASIC Design	F 2014	2		
ECE 520-601	S1 2014	9		

Petitioner Samsung Ex-1003, 0005

ECE 464-001	S 2014	10	4.5	4.5
ECE 520-001	S 2014	111	4.5	4.5
ECE 520-601	S 2014	9	4.5	4.5
ECE 733-001	S 2014	49	4.7	4.4
ECE 520-601	F 2013	2		
ECE 520-651 ASIC Design	SII '13	7	4.3	4.3
ECE 464-051 ASIC Design	SII '13	6	4.5	4.5
ASIC Design OOC	SII '13	635		
ECE 733 Digital Electronics	S 2013	62	4.5	4.3
ECE 520-001 ASIC Design	S 2013	136	4.6	4.5
ECE 464 ASIC Design	S 2013	(with above)	4.3	4.3
ECE 520-651 ASIC Design	Sum '12	18		
ECE 733 Digital Electronics	S 2012	52	4.2	4.2
ECE 520-601	S 2012	12	4.3	4.2
ECE 520-001 ASIC Design	S 2012	116	4.3	4.3
ECE 464 ASIC Design	S 2012	14	4.3	4.3
ECE 406 Des. Complex Systems	F 2011	58	4.6	4.6
ECE 520-651 ASIC Design	Sum '11	13	4.2	4.2
ECE 733 Digital Electronics	S 2011	18	4.5	4.5
ECE 520-601	S 2011	12	4.3	4.2
ECE 520-001 ASIC Design	S 2011	75	4.5	4.5
ECE 464 ASIC Design	S 2011	25	4.5	4.5
ECE 406 Des Complex Systems	F 2010	75	4.6	4.6
ECE 733 Digital Circuits 001	S 2010	36	4.3	4.2
ECE 733 Digital Circuits 601	S 2010	3	5.0	5.0
ECE 520 ASIC Design 001	S 2010	57	4.3	4.4
ECE 520 ASIC Design 601	S 2010	17	4.2	4.4
ECE 464 ASIC Design	S 2010	9	4.3	4.4
ECE 733 Digital Circuits 001	S 2009	57	4.6	4.5
ECE 733 Digital Circuits 601	S 2009	7	4.4	4.2
ECE 520 ASIC Design 001	S 2009	128	4.6	4.4
ECE 520 ASIC Design 601	S 2009	17	4.5	4.20
ECE 520 ASIC Design 620	S 2009	1		
ECE 464 ASIC Design	S 2009	16	4.6	4.4
ECE 733 Digital Circuits 001	S 2008	67	4.64	4.64
ECE 733 Digital Circuits 601	S 2008	2		
ECE 520 ASIC Design 001	S 2008	101	4.76	4.59
ECE 520 ASIC Design 601	S 2008	15	4.5	4.20
ECE 464 ASIC Design	S 2008	27	4.76	4.59
ECE 733	S 2007	58	4.64	4.46

Petitioner Samsung Ex-1003, 0006

ECE 520 ASIC Design 001	S 2007	129	4.75	4.68
ECE 520 ASIC Design 601	S 2007	6		
ECE 464 ASIC Design	S 2007	17	4.75	4.68
ECE 745 ASIC Verification	F 2006	20		4.6
ECE 733 Digital Circuits 001	S 2006	43	4.5	4.6
ECE 520 ASIC Design 001	S 2006	65		
ECE 520 ASIC Design 601	S 2006	8		
ECE 464 ASIC Design 001	S 2006	17	4.4	4.1
ECE 733 Digital Circuits 001	S 2005	30	4.5	4.6
ECE 733 Digital Circuits 601	S 2005	5		
ECE 520 ASIC Design 001	S 2005	44	4.6	4.3
ECE 520 ASIC Design 002	S 2005	34	4.6	4.5
ECE 520 ASIC Design 601	S 2005	2		
ECE 464 ASIC Design 001	S 2005	15	4.9	4.1
ECE 464 ASIC Design 002	S 2005	13	4.9	4.1
ECE 733 Digital circuits	S 2004	45	4.2 (4.1)	4.2 (3.9)
ECE 520 ASIC Design	S 2004	76	4.4 (4.1)	4.3 (3.9)
ECE 520 ASIC Design 601	S 2004	17		
ECE 464 ASIC Design	S 2004	69	4.5 (4.1)	4.0 (3.9)
ECE 733 Digital Circuits	S 2003	84	4.3 (4.0)	4.2 (3.8)
ECE 520 ASIC Design	S 2003	81	4.2 (4.0)	3.9 (3.8)
ECE 520 ASIC Design 601	S 2003	30		
ECE 464 ASIC Design	S 2003	63	3.9 (4.0)	3.5 (3.8)
ECE 406 Design Complex DS	F 2002	167	4.2 (4.1)	3.8 (3.9)
ECE 520 ASIC Design	S 2002	239	4.4 (4.1)	4.2 (3.9)
ECE 520 ASIC Design 601	S 2002			
ECE 464 ASIC Design	S 2002	39	4.1 (4.1)	3.6 (3.9)
ECE 406 Des. Complex Dig Sys	F 2000		4.7 (4.0)	4.5 (3.7)
ECE 704 Design For Test	F 2000		4.6 (4.0)	4 (3.8)
ECE 520 ASIC Design 001	S 2000		4.5 (4.1)	4.4 (3.9)
ECE 520 ASIC Design 002	S 2000		4.6 (4.1)	4.3 (3.9)
ECE 520 ASIC Design 601	S 2000			
ECE 492B ASIC Design	S 2000		4.5 (4.1)	4.3 (3.9)
ECE 342 Des. Complex Dig Sys	F 1999		4.4 (4.1)	4 (3.9)
ECE 520 ASIC Design 005	S 1999		4.6 (4.2)	4.5 (4.0)
ECE 520 ASIC Design 006	S 1999		4.5 (4.2)	4.3 (4.0)
ECE 342 Des. Complex Dig Sys	F 1998		4.3 (4.1)	4.1 (3.9)
ECE 520 ASIC Design	S 1998		4.6 (4.1)	4.4 (3.9)
ECE 492B ASIC Design	S 1998		4.7 (4.1)	4.8 (4.1)
ECE 342 Des. Complex Dig Sys	F 1997		4.6 (4.0)	4.4 (4.0)
ECE 520 ASIC Design	S 1997		4.7 (4.1)	4.7 (3.9)

Petitioner Samsung Ex-1003, 0007

ECE 492B ASIC Design	S 1997		4.7 (4.1)	4.4 (3.9)
AVERAGE				

- ECE 342 Design of Complex Digital Systems, Fall 1996, Overall Rating: 4.6/5.0.
- ECE 592B ASIC Design, Spring 1996, Overall Rating: 4.75/5.0. (With Dr. Liu.)
- ECE 492B ASIC Design, Spring 1996, Overall Rating: 4.00/5.0. (With Dr. Liu.)
- ECE 544, Design of Electronic Packaging and Interconnects, Spring 1999, Overall Rating : 4.60/5.0.
- ECE 520, Fundamentals of Logic Systems, Fall 1995, Overall Rating: 4.50/5.0.
- ECE 218, Computer Organization and Microprocessors, Both Sections, Spring, 1995: Section 001: 4.45/5.0; Section 002: 4.62/5.0.
- ECE 592V, VLSI Microprocessor Project, Spring 1995. (13 students but not rated).
- ECE 681/693A, Computer Engineering Seminar. Spring 1996 and Fall 1996.
- ECE 521 Computer Design and Technology, Fall 1994, Overall Rating: 4.24/5.0.
- ECE 691F, High Speed VLSI, Fall 1994, Overall Rating: 4.45/5.0.
- ECE 691P, Superscalar Processor Design, Spring 1994, Overall Rating: 4.67/5.0.
- ECE 591F, Design of Electronic Packaging and Interconnects, Spring 1994, Overall Rating: 4.60/5.0.

B. INSTRUCTIONAL DEVELOPMENT

1. NSF-funded CISE Infrastructure effort, “Experimental High Performance Computing and Communications Systems". (Total: $1,338,283 including $503,046 in matching.) Approximately $283,000 of this funding went towards outfitting the ECE Design Center.

2. CAD Tools. Modern design is done with sosphisticated Computer – Aided Design Tools, not with pencil and paper. I have spent considerable effort bringing such tools into the Unity environment, gaining the `corporate knowledge' about how to use these tools effectively and obtaining additional computers for use with these tools. *Students tell me that knowledge of these tools is highly regarded by potential employers. In fact one student stated that `Dr. Franzon teaches courses that gets jobs'. In addition , in 1999, we won the Cadence University Alliance Best Web site Awards.* Through my funded research efforts and Corporate Donations introduced the following Computer Aided Design Tools into the curricula:

- Cadence Design Systems. A complete suite of over 4 GB of executables that facilitate chip, board and system design, with a retail value of over $100,000,000. Cadence donates these tools because of the widespread recognition of our contributions to CAD. (i.e. It waives the $5,000 fee.)
- Synopsys. The industry leading chip (ASIC) synthesis tool,with a retail value of over $7,000,000.
- In 2008, NCSU won the “Babbage Award” from Sun and Synopsys, in recognition of our contributions towards lab infrastructure. The award comes in the form of $15,000 of computers.

Petitioner Samsung Ex-1003, 0008

- Mentor. We integrate some mentor graphics tools with the other tools above. The tools have a retail value of over $5,000,000. Mentor donates these tools because of the widespread recognition of our contributions to CAD.
- Mentor donates $30,000 annually to the University to assist in CAD infrastructure development.

As well as obtaining these tools, my group has spent considerable effort making these tools useful to us by writing integration scripts and generating `know-how'. Much of this `know-how' has been published on the Web and in our own lockers. Most of this learning was conducted driven by research needs and serves as an excellent example of the integration of research and teaching. This work is ongoing. For example, over 2000 organizations world-wide, use our "Physical Design Kit"..

3. ECE 745. ASIC Verification. I introduced this course in 2007, though it was taught by Meeta Yadav.

4. ECE 342, Design of Complex Digital System, Fall 1996:
   - Completely redesigned and updated course to reflect modern design practices, and use of modern Hardware Description Languages and Design Tools.
   - Completed a new laboratory course ECE 342L for use with this course.

5. ECE 520 ASIC Design (formerly `Fundamentals of Logic Systems'), Spring 1997:
   - Based on my teaching of ECE592B in Spring 1995, this course has been completely updated to reflect modern design practices, modern tools, and emphasize an understanding of algorithms used in modern tools. (`ASIC' stands for `Application Specific Integrated Circuit'. For example the chips in a satellite dish receiver are ASICs. ASIC engineering is the fastest growing area of ECE today.)
   - Once the course action forms are approved, this course will be taught concurrently with ECE 420 ASIC Design.

6. ECE 544, Design of Electronic Packaging and Interconnects, Spring 1995. New course emphasizing `transmission line effects' in electronic packages and how to design `deep sub-micron interconnect'. I receive tremendous demand from industry for graduates from this course.

7. ECE 691/693A, Computer Engineering Graduate Seminar
   - Created new seminar course (with Dr. Tom Conte) for computer engineering students.
   - Recruited and scheduled weekly speakers.

8. ECE CAD Lab. $75,000. Provost Office, 1995.

C. MENTORING ACTIVITIES

UNDERGRADUATE STUDENT SUPERVISIOR

1. 2012. Spring advisor to two undergraduates.

Petitioner Samsung Ex-1003, 0009

2. 2010. Summer REU supervisor to three Undergraduates
3. 2009. Summer REU supervisor to one Undergraduate.
4. 2009. Supervised Senior Design Team
5. 2008. Summer REU supervisor to two Undergraduates.
6. 2005 Andrew Pita, SRC Undergraduate Research Fellowship
7. 1999 Ecoh Oh, NSF Undergraduate Research Award
8. 1999 Ben Hughes, NSF Undergraduate Research Award
9. 1993- Numerous Senior Design projects

GRADUATE STUDENT SUPERVISION

GRADUATE COMMITTEES

Currently member of several PhD and MS committees.

GRADUATE COMMITTEES

For a list of graduate committees I chair, see below. I am on numerous committees as a member, but I do not track the numbers.

D. MASTER'S AND DOCTORAL THESES DIRECTED AND BEING DIRECTED

Masters and Doctoral Theses under direction

Student's Name	Ph.D. MS	Chair/ Co-chair
Han Pan	PhD	x
Ahmad Benaki	PhD	x
George Li	PhD	X
Wen Yuejing	PhD	X
Josh Stevens	PhD	X
Archit Gaijar	PhD	X
Priyank Kashyap	PhD	X
Batool Khader	PhD	X

I do not track memberhips.

Doctoral Theses Directed

1. Luis Francisco, "Machine Learning for Design Rule Checking, Multilayer CMP Hotspot Detection, using Transfer Learning and Synthetic Training", May 202, co-Chair..
2. Billy Huggins, "An Evolutionary Approach to Producing Optimal Electronic Design Automation Tool Settings", May 2021, co-chair.

Petitioner Samsung Ex-1003, 0010

3. Theodros Nigussie, "Design obfuscation throught smart partitioning and 3D integration,", Mar. 2020, chair.
4. Kirti Bhanashuli, "On implementing power-efficient and scalable short-range RF-power radios using RF-only architectures," Jan., 2020, chair.
5. Yi Wang, "Solving Inverse Problem through optimization and its application to Analog/RF Design," March 2020, chair.
6. Bowen Li, "High-speed receiver behavioral modeling using machine learning,", Jan. 2020, chair.
7. Sumon Dey, "Design of a scalable, confirugate and cluster-based hierarchical hardware accelerator for a cortically inspired algorithm and recurrent neural networks," August, 2019, chair.
8. Weifu Li. Design of Hardware Accelerators for Hierarchical Temporal Memory and Convolutional Neural Networks", August 2019, chair.
9. Nazia Zannat, "Design of contactless connectors for simultaneous power and data transfer," May, 2019, chair.
10. Zhao Wang, "Efficient linear matrix solver and its hardware implementations dedicated to faster than real time dynamic simulation of large scale power systems," September, 2018, chair.
11. Lee Baker, "Design of a 3DIC system to aid in the acceleration of embedded system that employ multiple instances of disparate artificial neural networks," March 2018, chair.
12. Jong Beom Park, "A circuit level three-dimensional DRAM area timing and energy model," March 2018, co-chair.
13. Josh Schabel, "Design of an application specific instruction set processor for sparse neural networks,", October 2017, chair.
14. Weiyi Qi, "IC Design Analysis, Optimization and Reuse via Machine Learning, August, 2017, Chair.
15. Wenxu Zhao, "RF-only Logic Enbabled RFID Transponder Size Reduction,", December 2016. Chair.
16. Marcus Tshibangu, "Study and analysis of Energy Efficient DRAM Cache with unconventional row buffer size," August 2016. Chair.
17. Randy Widialaksono, "Three Dimensional Integration of Hterogeneous Multi-Core Processors," June, 2016. Co-chair.
18. Zhenquian Zhang, "Design of On-chip bus of Heterogeneous 3DIC Micro-processors," May 2016, Chair.
19. Sarkar, Biplap, "Atomic Layer Deposition Techniques for Novel Memory Applications," August 2015. Cochair
20. Winick, David, "Electroactive Polymer Refreshable Braille Display, December 2015 (Posthumous).
21. Gary Charles, "Design, Model and Analysis of TSV-based On-Chip PDN Interconnects for 3-D Integrated Circuits. ", March 2015.
22. Zhao Yan, "S-Parameter Based Binary Multimode Interconnect Design Methodology and Implementation," December, 2014 .
23. W.S. Pitts, "High quality CMOS Integratable Varactors," March 2014.
24. Peter Gadfort, "Packaging and Integration of Three Dimensional Microsensors," December, 2013.
25. Evan Erickson, "Multi-Gbps Inductively Coupled Connectors," December, 2013.

Petitioner Samsung Ex-1003, 0011

26. Akalu Lentiro, "Low-Density, Ultra-Low Power and Smart Radio Frequency Telemetry Sensor," October, 2013.
27. Shivam Priyadarshi, "System and Gate Level Dynamic Electrothermal Simulation of Three Dimensional Integrated Circuits," June, 2013.
28. Eric Wyers, "Direct Search Calibration Algorithms for Digitally Reconfigurable Radio Frequency Integrated Circuits," March 2013.
29. Ojas Ashok BOpat, "A Generic Scalable Architecture For a Large Acoustic Model and Large Vocabularly Speech Recognition Accelerator," October, 2012.
30. Won Hao Choi, "System Level Power Prediction Methodology for Mobile 3-D Graphic Engines," May 2012.
31. Hsuan-Jung Su, "Continuous-Time Fractionally Spaced Equalization and Its Application in Capacitively Coupled Chip-To-Chip Interconnect," May, 2012.
32. Matthew Hamlett, "A Novel Approach to IP Protection Using Automated Hardware Techniques to Secure a Design," March 2012.
33. Mustafa Berke Yelten, "Variability and Reliability in Nanoscale Circuits: Simulation, Desgin, Monitoring and Characterization," January, 2012.
34. Hoon Seok Kim, "Advanced Multi Mode Interconnect," December, 2011.
35. Xiangzhong Xue, "Electronic System Optimization Via Convex Programming," December, 2011.
36. Tsing Zhu, A Surrogae Model-based Framework for Design and Macromodeling of Self-calibrated Analog Circuits," October, 2011.
37. Chanyoun Won, "Multimode Interconnect for High-Density Links: Implementation, Design Methodology and New Crosstalk Cencallation Scheme," July 2011
38. Thor Thorolfsson, "Three Dimensional Integration of Synthetic Aperture Radar Processors," April 2011
39. Daniel Schinke, "Computing with Novel Floating Gate Devices," April 2011
40. Yongjin Choi, "Design of Multimodel Signaling Transceiver for High-Density and High-Speed Links," May 2010.
41. Eun Chu Julie Oh, Ph.D. Dissertation, "Design and Applications of Three-Dimensional Circuits", December, 2009.
42. Karthik Chandrashekhar, Ph.D. Dissertation, "Inductively Coupled Connectors," December, 2008
43. Dhruba Chandra, Ph.D. Dissertation, Speech Recognition CoProccessor, December, 2007.
44. Meeta Yadav, "Hardware Architecture of behavior Modeling Coprocessor for Network Intrusion Detection," Ph.D. Dissertation, March, 2007.
45. Ullas Pazhayaveetil, "Hardware Implementation of a Low Power Speech Recognition System," Ph.D. Dissertation, February, 2007.
46. Jian Xu, "AC Coupled Interconnect for Inter-Chip Communications," Ph.D. Dissertation, December, 2006.
47. Ambrish Varma, "Improved behavioral modeling based on Input Output Buffer Information Specification," Ph.D. Dissertation, NCSU, October, 2006.
48. Sachin Sonkusale, "Planar edge defined alternate layer process (PEDAL) – an unconventional technique for the fabrication of wafer scale sub-25 nm nanowires and nanowire template," PhD, October, 2006.

Petitioner Samsung Ex-1003, 0012

49. Liang Zhang, "Driver Pre-emphasis Signaling for on-chip global interconnects," Ph.D. Dissertation, September, 2006.
50. Monther Al Dwairi, "Hardware Efficient Pattern Matching Algorithms and Architectures for Fast Intrusion Detection," Ph.D., November, 2006.
51. John Damiano, "Active body bias for low-power silicon-on-insulator design," Ph.D., March 2006.
52. Neil DiSpigna, "Electronic Devices and Interface Strategies for Nanotechnology," Ph.D., April 2006.
53. Christian Amsinck, "Molecular Electronic Memories," Ph.D., March 2006.
54. Lei Luo, "Capacitively Coupled Chip to Chip Interconnect Design, Ph.D., December, 2005.
55. Leon Zhang, "Driver pre-emphasis signaling for on-chip global interconnects," Ph.D., December, 2005.
56. Steve Lipa, "Phase Noise Analysis of Rotary Oscillators," Ph.D. May 24, 2005
57. David Nackashi, Circuit and Integration Technologies for Molecular Electronics, Ph.D. 2004
58. Stephen Mick, AC Coupled Interconnect, Ph.D. 200
59. John Wilson, Linearly Tunable RF MEMS Capacitors Implemented Using an Integrated Removable Self-Masking Technique, Ph.D. 2004
60. Andrew Stanaski, Sensor Circuits for Flip Chip Debug, Ph.D. 2004
61. Pronita Mehrotra, High Performance Hardware Memory Algorithms, Ph.D. 2003
62. Bruce Duewer, MEMS Switch Fabric, Ph.D.
63. Toby Schaffer, Chip-package Codesign, Ph.D.
64. Mouna Nakkar, Dynamically Programmable Cache, Ph.D.
65. Mir Azam, Custom CMOS Design and Architecture for Low-Power High-Performance Circuits, PhD.
66. Debu Ghosh (co-chair), Synthesis of Benchmarking Expiriments, Ph.D.
67. Chris Harvatis, Performance Driven Partitioning for MCMs, PhD.
68. Slobodan Simovich, Computer-Aided Analysis of Interconnect,PhD.
69. Scott Washabaugh, Low energy FSM Design, PhD.
70. Sharad Mehrotra, Automated Synthesis of High Speed Digital Circuits and Package-Level Interconnect, PhD.
71. Todd Cook, Instruction Set Architecture Specification, PhD.
72. Robert Evans, Energy Consumption for Modeling and Optimization of SRAMs, PhD.

<u>Masters Theses directed</u>

1. Abhishek Bhattacharya, "Design and Power Optimization of a16 nm Dual Floating Gate FET Memory Array and Peripheral Circuits," October, 2013.
2. Joshua Schabel, "An Analysis of Subthreshold SRAM Bitcells for Operation in Low Power RF only Technologies," July 2013.
3. Vinod Kotipllai, "Impact of Process Variations on 16-nm Dual Floating Gate FET using TCAD simulations," December 2012.
4. Wenxu Zhao, "Headphone Deiver Design with Inductive Coupled Interconnection," November, 2012.

Petitioner Samsung Ex-1003, 0013

5. Shiney Gupta, "Multi-Storey Stacked Driver Topolo9gy for Reduced Swing and Low Power Bus Operation,", May 2012.
6. Pattabhiraman Ravindran, "Harvesting Thermal Energy to Power Agricultural Sensors," October, 2011.
7. Alex Leaonard, "Implementation of a System-on-Chip for self-healing of analog receiver components in a 65 nm CMOS process", May 2011
8. Seema Kumar, "Memory Diesgn for Sensor IC," May 2010.
9. Mihir Shiveshwarkar, "A Nanocrystal Floating Gate Flash Analog to Digital Converter," December, 2009.
10. Ojas Bapat. "Design of DDR2 Interface for Tezzaron TSC8200A Octupus Memory intended for Chip Stacking Applications," April 2009.
11. Peter Gadfort, "Low power driver for silicon carrier interconnects," April 2009.
12. Chintan Shah, "Inductively Coupled Interconnect for Chip to Chip Commmunication over Transmission Line," Feb 2009.
13. Kiran Gonsalves, "Memory Design for FFT Processor in 3DIC Technology," March, 2009.
14. Vinay Honnavara, "Cost optimization by method of allocating software component units to electronic control units for model-driven designs," October, 2008.
15. Wei Cao, "Design of temperature sensors for validation of aseptic food processing," Sept. 2008.
16. Akalu Lentiro, "Implemention of AC Coupled Interconnect Test Vehicle," May, 2008.
17. Vinayak Devasthali, "Application of body biasing and supply voltage scaling techniques for leakage reduction and performance improvement of CMOS Circuits," December 2007.
18. Paul Fernando, "Adding scalability to IBIS using AMS Languages," September 2007.
19. Vivek Jayadav, "Hardware-Software Codesign of a Large Vocabularly Speech Recognition System," February, 2007.
20. Srivatsan Parthasarathy, "Interfacing AC Coupled Interconnect Design with Rocket I/O compatible FPGA Systems," December 2006.
21. Janani Mukundan, "Instruction Cache Checkpoints Using Phase Tracking and Prediction," June 2006.
22. Yasaswini Sudarsanam, "Implementatin of Double Precision Floating Point Arithmetic for Matrix Multiplication," October 2006
23. Itisha Tyagi, "Design of array based row decoders and self-referencing sense amplifier for large scale resistance change style molecular memories," June 2006.
24. Indraneel Kelkar, "Tradeoffs involved in the design of SRAMs," December 2005.
25. Wallace Pitts, "Partially depleted silicon on insulator phase lock loop design," January, 2006.
26. Janani Mukundan, "Instruction cache checkpoints using phase tracking and prediction," December 2006.
27. Deepak Kumar, "Design of fully integrated wireless CMOS MEMS device for intraocular pressure measurement," March 2006.
28. Manav Shah, "Design of a self-test vehicle for AC Coupled Interconnect Technology," May 2006.

Petitioner Samsung Ex-1003, 0014

29. Andrew Morgan, Design Flow based on Sensitivity Analysis for High Speed Digital Circuits, MS, 2004
30. Brian Phelp, Hardware Realization and Implementation Issues for the Sliding Window Packet Switch, MS, 2004
31. Ishdeep Sawhney, Hardware Forwarding for IPV6, MS, 2003
32. Kaustabh Bhate, MEMS Design for textiles sensor, MS
33. Praveen Prasad, Reconfigurable Computing for Network Security, MS
34. Patrick Lall, Verification of a Network Processor, MS
35. Ambrish Varma, SHOCC Design Tools, MS
36. Karthik Chandrasekhar, Hardware to support multicast in all-optical networks, M
37. V. Parameshawara (co-chair), Enhancement of NC Agricultural Automated Weather Network and Development of Advanced Communication, Data Acquisitions amd Dissemation System, MS.
38. Jeremy Palmer, Design and Analysis of a VLSI-MEMS-Based Diffractive Optical Beam Steering System, MS.
39. Som Chaudry, MEMS devices for laser radar, MS.
40. Srisai Rao, Design, place and route of an IDEA processor, MS.
41. Kevin Mock, IDEA Implementation, MS.
42. Sibi Kuruvilli, Synthesized SAND Issue Unit, MS
43. Tom Mills, Macromodelling of high speed digital drivers and receivers, MS.
44. Matreiya Sengupta, Managing Crosstalk in Interconnect Design, MS.
45. Andrew Stanaski, Optimizing Memory Design for Packagability, MS.
46. Jonathon Schaeffer, A 400 MHz CMOS Multiplier, MS.
47. Harsh Deshmane, MCM Extractor in Magic, MS.
48. Sha Ma, Circuits for Low Energy Computing, MS.
49. Shauki Elassaad, Placement tools for multi-chip modules, MS.
50. Alex Dalal, CAD tools for yield estimation, MS.

Committee Memberships: Do not track

D. HONORS AND AWARDS RELATED TO TEACHING AND MENTORING

- Board of Governers Teaching Award for Excellence in Teaching, 2014
- Babbage Award, Synopsys, 2008
- ECE Graduate Teacher of the year award, 2007
- ECE Most Helpful Teacher of the year award, 2007
- ECE Teacher of the year award, 2006
- ECE Graduate Advisor of the year award, 2006
- Alumni Undergraduate Distinguished Professor, 2003-2005.
- Graduate teacher of the year, ECE department, 2005
- Selected to the NCSU Academy of Outstanding Teachers, 2001
- First round prize winner, SRC copper challenge, 2000.
- Teacher of the Year Award, presented by the IEEE Student Branch, 1997

Petitioner Samsung Ex-1003, 0015

III. SCHOLARSHIP IN THE REALMS OF FACULTY RESPONSIBILITY

A. PUBLICATIONS AND AWARDS

BOOKS

1. P. Franzon, E. Martissen, M. Bakir (eds), "3DIC Handbook Design and Test" (Wiley), 2019.

2. Smith and P. Franzon*: Verilog Styles for Synthesis of Digital Systems*, 2000, by Prentice Hall.

3. D. Doane and P. Franzon: *Multichip Modules: Basics and Alternatives*, 1993, by Van Nostrand Rheinhold.

4. J-D Cho and P.D. Franzon, *High Performance Design Automation for Multi-Chip Modules and Packages*, 1996, World Scientific.

BOOK CHAPTERS

1. Yi Wang, P. Franzon, "Solving the inverse problem through optimization – Applications to Analog/RF IC Design," to appear in "Surrogate Modeling for High-Frequency Design - Recent Advances", S. Koziel (ed). 2021. (World Scientific)

2. P. Franzon, "3D Integration: Technology and Design," in "3D Integration in VLSI Circuits," in K. Sakuma (ed), 2018.

3. P. Franzon, "Electronic Design Automation for 3D", in "3D Handbook Design and Test,", P. Franzon, E. Martissen, M. Bakir (eds), (Wiley), 2019.

4. P. Franzon, "3D Design Styles", in "3D Handbook Design and Test,", P. Franzon, E. Martissen, M. Bakir (eds), (Wiley), 2019.

5. G. Burr, P. Franzon, "Storage Class Memories", in "Emerging Nanoelectronic Devices," An Chen, J. Hutchby, V. Zhrinov, G. Bourianoff, (Wiley), 2014.

6. P. Franzon, M. Swaminathan, "Chip Package Codesign," in The Handbook for EDA of Electronic Circuits, Lou Scheffer, Luciano Lavagno and Grant Martin (editors), CRC Press, 2015. (Second Edition.)

7. Eric Wyers, Tim Kelley, and Paul Franzon, "Optimization for Self-Calibrating Circuits," in Semiconductor Devices in Harsh Conditions, (CRC), 2015.

Petitioner Samsung Ex-1003, 0016

8. Ting Zhu, Mustafa Berke Yelten, Michael B. Steer, and Paul D. Franzon**, "**Model-based Variation Aware Integrated Circuit Design", (Springer)

9. P. Franzon, "Use of AC Coupled Interconnect in Contactless Packaging," in "Coupled Data Communications," Ron Ho and Ivan Sutherland (ed), Springer-Verlag, Fall 2010

10. P. Franzon, *Design for 3-D Integration,* 3-D IC Integration: Technology and Applications, P. Garrou, P. Ramm, C. Bower, (editors), Wiley VCH, May 2008.

11. P. D. Franzon, D. Nackashi, C. Amsinck, N. DiSpigna, S. Sonkulale, "Molecular Electronics – Devices and Circuits Technology", in Vlsi-Soc: From Systems To Silicon, (Springer Boston), Oct. 2007.

12. P. Franzon, *Chip-Package Codesign,* in The Handbook for EDA of Electronic Circuits, Lou Scheffer, Luciano Lavagno and Grant Martin (editors), CRC Press, 2005.

13. P. Franzon, *Multichip Module Technology*, to appear in the The Electronic Handbook, J. Whitaker (editor), (CRC Press), 1996.

14. S. Mehrotra and P. Franzon, *Performance Driven Global Routing and Wiring Rule Generation for High Speed PCBs and MCMs* , in Advanced Routing of Electronic Modules, M. Pecht (editor), (Kluwer), 1995.

15. P. Franzon and Michael Steer: *Tools and Techniques for the Design of High Speed Multichip Modules*}, Chapter 7 in Electronics Packaging Forum,Volume 3, J. Morris (ed), 1993 by IEEE Press.

16. P. Franzon, *Comparison of Reconfiguration Schemes for Defect Tolerant Mesh Arrays* , in Defect and Fault Tolerance in VLSI Systems, Volume 2, V.K. Jain (editor), (Plenum), 1989.

17. M. Hatamian, L.A. Hornak, T. Little, S.K. Tewksbury and P. Franzon: *Fundamental interconnection issues* in, Electronic Materials Handbook,Volume 1:Packaging, Article 1BA (ASM International), 1989, pages 1-11.

18. P. Franzon and S.K. Tewksbury: *'Chip Frame'* scheme for reconfigurable mesh-connected arrays, in Wafer Scale Integration II, R.M. Lea (editor), (North Holland), 1988.

19. P.D. Franzon: *Yield Modeling for Fault Tolerant VLSI* ,in Systolic Arrays, W. Moore, A. McCabe and R. Urquhart (editors), (Adam Hilger), 1987.

<u>JOURNAL PUBLICATIONS</u>

Petitioner Samsung Ex-1003, 0017

1. L. Francisco, W. Rhett Davis and P. Franzon, "A Deep Transfer Learning Design Rule Checker with Synthetic Training," in *IEEE Design & Test*. 2022. doi: 10.1109/MDAT.2022.3162786

2. K. Bhanushali, W. Zhao, W. S. Pitts and P. D. Franzon, "A 125 µm × 245 µm Mainly Digital UHF EPC Gen2 Compatible RFID Tag in 55 nm CMOS Process," in *IEEE Journal of Radio Frequency Identification*, vol. 5, no. 3, pp. 317-323, Sept. 2021.

3. P. Kashyap, F. Aydin, S. Potluri, P. D. Franzon and A. Aysu, "2Deep: Enhancing Side-Channel Attacks on Lattice-Based Key-Exchange via 2-D Deep Learning," in *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, vol. 40, no. 6, pp. 1217-1229, June 2021.

4. N. Zannat and P. D. Franzon, "Asymmetric Transformer Design With Multiband Frequency Response for Simultaneous Power and Data Transfer," in *IEEE Transactions on Components, Packaging and Manufacturing Technology*, vol. 10, no. 4, pp. 644-653, April 2020.

5. P. Kashyap, F. Aydin, S. Potluri, P. Franzon and A. Aysu, "2Deep: Enhancing Side-Channel Attacks on Lattice-Based Key-Exchange via 2D Deep Learning," in *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, 2020.*

6. B. Li, B. Jiao, C. Chou, R. Mayder and P. Franzon, "Self-Evolution Cascade Deep Learning Model for High-Speed Receiver Adaptation," in *IEEE Transactions on Components, Packaging and Manufacturing Technology*, vol. 10, no. 6, pp. 1043-1053, June 2020.

7. Yi Wang, P. Franzon, D. Smart, B. Swahn, “Multi-fidelity surrogate-based optimization for electromagnetic simulation acceleration”, ACM Trans. Design Automation of Electronic Systems, Aug. 2020, No. 45

8. J. B. Park, W. R. Davis and P. D. Franzon, "3-D-DATE: A Circuit-Level Three-Dimensional DRAM Area, Timing, and Energy Model," in *IEEE Transactions on Circuits and Systems I: Regular Papers*, vol. 66, no. 2, pp. 756-768, Feb. 2019.

9. S. W. Park, L. B. Baker and P. D. Franzon, "Appliance Identification Algorithm for a Non-Intrusive Home Energy Monitor Using Cogent Confabulation," in *IEEE Transactions on Smart Grid*, vol. 10, no. 1, pp. 714-721, Jan. 2019.

10. J. C. Schabel and P. D. Franzon, "Exploring the Tradeoffs of Application-Specific Processing," in *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, vol. 8, no. 3, pp. 531-542, Sept. 2018.

11. W. Zhao, P. Gadfort, K. Bhanushali and P. D. Franzon, "RF-Only Logic: an Area Efficient Logic Family for RF-Power Harvesting Applications," in *IEEE Transactions on Circuits and Systems I: Regular Papers*, vol. 65, no. 1, pp. 406-418, Jan. 2018.

Petitioner Samsung Ex-1003, 0018

12. B. Sarkar, S. Mills, B. Lee, W. Pitts, V. Misra, P. Franzon, “On Using the Volatile Mem-Capacitive Effect of TiO2 Resistive Random Access Memory to Mimic the Synaptic Forgetting Process,” in Journal of Electronic Materials, v 47, n 2, p 994-997, February 1, 2018

13. Kim, C. Won and P. D. Franzon, "Corrections to “Crosstalk-Canceling Multimode Interconnect Using Transmitter Encoding”[Aug 13 1562-1567]," in *IEEE Transactions on Very Large Scale Integration (VLSI) Systems*, vol. 25, no. 5, pp. 1792-1792, May 2017.

14. E. J. Wyers, M. A. Morton, T. C. L. G. Sollner, C. T. Kelley and P. D. Franzon, "A Generally Applicable Calibration Algorithm for Digitally Reconfigurable Self-Healing RFICs," in *IEEE Transactions on Very Large Scale Integration (VLSI) Systems*, vol. 24, no. 3, pp. 1151-1164, March 2016.

15. Z. Yan, K. Aygün, H. Braunisch and P. D. Franzon, "Multimode High-Density Link Design Methodology and Implementation," in *IEEE Transactions on Components, Packaging and Manufacturing Technology*, vol. 6, no. 8, pp. 1251-1260, Aug. 2016.

16. G. Charles and P. D. Franzon, "A Multitier Study on Various Stacking Topologies of TSV-Based PDN Systems Using On-Chip Decoupling Capacitor Models," in *IEEE Transactions on Components, Packaging and Manufacturing Technology*, vol. 5, no. 4, pp. 541-550, April 2015

17. Bapat, O.A.; Franzon, P.D.; Fastow, R.M., "A Generic and Scalable Architecture for a Large Acoustic Model and Large Vocabulary Speech Recognition Accelerator Using Logic on Memory," *Very Large Scale Integration (VLSI) Systems, IEEE Transactions on* , vol.PP, no.99, pp.1,1, 2014.

18. Xi Chen; Ting Zhu; Davis, W.R.; Franzon, P.D., "Adaptive and Reliable Clock Distribution Design for 3-D Integrated Circuits," Components, Packaging and Manufacturing Technology, IEEE Transactions on , vol.4, no.11, pp.1862,1870, Nov. 2014

19. Gadfort, P.; Franzon, P.D., "Millimeter-Scale True 3-D Antenna-in-Package Structures for Near-Field Power Transfer," Components, Packaging and Manufacturing Technology, IEEE Transactions on , vol.4, no.10, pp.1574,1581, Oct. 2014

20. Priyadarshi, S.; Davis, W.R.; Steer, M.B.; Franzon, P.D., "Thermal Pathfinding for 3-D ICs," Components, Packaging and Manufacturing Technology, IEEE Transactions on , vol.4, no.7, pp.1159,1168, July 2014

21. Sarkar, B.; Ramanan, N.; Jayanti, S.; Di Spigna, N.; Bongmook Lee; Franzon, P.; Misra, V., "Dual Floating Gate Unified Memory MOSFET With Simultaneous Dynamic and

Petitioner Samsung Ex-1003, 0019

Non-Volatile Operation," *Electron Device Letters, IEEE* , vol.35, no.1, pp.48,50, Jan. 2014

22. Wyers, E.J.; Steer, M.B.; Kelley, C.T.; Franzon, P.D., "A Bounded and Discretized Nelder-Mead Algorithm Suitable for RFIC Calibration," *Circuits and Systems I: Regular Papers, IEEE Transactions on* , vol.60, no.7, pp.1787,1799, July 2013

23. HoonSeok Kim; Chanyoun Won; Franzon, P.D., "Crosstalk-Canceling Multimode Interconnect Using Transmitter Encoding," *Very Large Scale Integration (VLSI) Systems, IEEE Transactions on* , vol.21, no.8, pp.1562,1567, Aug. 2013

24. T. Zhu, M. Steer, P. Franzon, "Surrogate model-based self-calibrated design for process and temperature compensation in Analog/RF circuits," in IEEE Design and Test, Vol. PP, No. 99, 2013.

25. M.B. Yelten, P.D. Franzon, M.B. Steer, "Analog Negative Bias Temperature Instability Monitoring Circuit," in IEEE Trans. Device and Materials Reliability, Vol. 12., No. 1, 2012, pp. 177-179.

26. R.T. Harris. S. Priyadarshi, S. Melamed, C. Ortega, M. Rajit, S. Doorly, N. Kriplani, W. Davis, P. Franzon, M. Steer, "A transient electrothermal analysis of three-dimensional integrated circuits," in IEEE Trans. CPMT, Vol. 2, No. 4, 2012, pp. 660-667.

27. S. Priyadarshi, C. Saundrs, N Kriplani, H. Demiricoglu, W. Davis, P. Franzon, M.B. Steer, "Parallel transient simulation of multiphysics circuits using delay-based partitioning," in IEEE Tran. CAD, Vol. 31, No. 10, 2012, pp. 1522-1535.

28. S. Melamed, T. Thorolfsson, R.T. Harris, S. Priyadarshi, P.D. Franzon, M.B. Steer, W.R. Davis, "Junction level thermal analysis of 3-D integrated circuits using high definition power blurring," in IEEE Trans CAD, Vol. 31, No. 5, 2012, pp. 676-689.

29. M.B. Yelten, T. Zhu, S. Koziel, P.D. Franzon, M.B. Steer, "Demystifying Surrogate Modeling for Circuits and Systems," in IEEE Circuits and Systems Magazine, VOl. 12, No. 1, 2012, pp. 45-63.

30. S. Priyadarshi, T.R. Harris, S. Melamed, C. Otero, N.M. Kriplani, C.E. Christoffersen, R. Manohar, S.R. Dooley, W.R.Davis, P.D. Franzon, M.B. Steer, "Dynamic Electrothermal Simulation of Three-Dimensional Circuits Using Standard Cell Macromodels," in IET Circuits, Devices, and Systems, Vol. 6., No. 1., 2012, pp. 35-44.

31. M.B. Yelten, P.D. Franzon, M.B. Steer, "Analog Negative Bias Temperature Instability Monitoring Circuit," in IEEE Trans. Devices and Materials Reliability, Vol. 12, No. 1, 2012, pp. 177-179.

Petitioner Samsung Ex-1003, 0020

32. P. Chakraborti, H. Topraki, P. Yand, N. DiSpigna, P. Franzon, T. Ghosh, "A compact dielectric elastomer tubular actuator for refereshable Braille displays," in Sensors and Actuators A:Physical, V> 179, p. 151-157, June 2012.

33. T.R. Harris, S. Priyadarshi, S. Melamed, C. Ortega, R. Manohar, S.R. Dooley, N.M. Kriplani, W.R. Davis, P.D. Franzon, M.B. Steer, "A Transient Electrothermal Analysis of Three-Dimensional Integrated Circuits," in IEEE Trans CPMT, Vol. P, Issue 99, 2012, pp. 1.

34. T. Zhu, M.B. Steer, and P.D. Franzon, "Accurate and Scalable IO Buffer Macromodel Based on Surrogate Modeling," in IEEE Transactions CPMT, VOl. 1, Issue 8, 2011, pp. 1240-1249.

35. M.B. Yelten, P.D. Franzon and M.B. Steer, "Surrogate Model-Based Analysis of Analog Circuits – Part I. Variability Analysis," in IEEE Trans. Device and Materials Reliability, Vol. PP, Issue 99, 2011.

36. M.B. Yelten, P.D. Franzon and M.B. Steer, "Surrogate Model-Based Analysis of Analog Circuits – Part II. Reliability Analysis," in IEEE Trans. Device and Materials Reliability, Vol. PP, Issue 99, 2011.

37. D. Schinke, N. DiSpigna, M. Shiveshwarkar, and P. Franzon, "Computing With Novel Floating Gate Devices", in IEEE Computer, Vol. 44, No. 2, 2011, pp. 29-36.

38. D. Schinke, S. Priyadarshi, W.S. Pitts, N.H. DiSpigna, P.D. Franzon, "SPICE-compatible Physical Model of Nanocrystal Floating Gate Devices for Circuit Simulation," in IET Circuits, Devices and Systems, Vol. 5, No. 6, 2011, pp. 477-483.

39. T. Thorolffson, N. Moezzi-Madani, P.D. Franzon, "Reconfigurable five-layer three-dimensional integrated memory on logic synthetic aperture radar processor, in IET Computers and Digital Techniques, Vol. 5, Issue 3, 2011, pp. 198-204.

40. L. Zhang, J.M. Wilson, R. Bashirullah, L. Luo, J. Xu, P. Franzon, "A 32-Gb/s on-chip Bus with Driver Pre-Emphasis Signaling," in Trans. VLSI, Vol. 17, No. 9, Sept. 2010, pp. 1267-74.

41. H. Tao, D. Corley, M. Lu, N. DiSpigna, D. Nackashi, P. Franzon, J. Tour, "Controllable Molecular Modulation of Conductivity in Silicon Based Devices," in Journal of the American Chemical Society, 131(29), 2009, pp. 10023-30.

42. W. Davis, E. Oh, A. Sule, T. Thorolfsson, and P.D. Franzon, "Application Exploration for 3-D Integrated Circuis: TCAM, FIFO and FFT Case Studies," in IEEE Trans. On VLSI, Vol. 17, No. 4, April 2009, pp. 496-506.

43. A. Varma, M.B. Steer, and P.D. Franzon, "Improving Behavioral IO Buffer Modeling Based on IBIS," in IEEE Trans. Adv. Pack., VOl. 31, No. 4, Nov. 2008, pp. 711-721.

Petitioner Samsung Ex-1003, 0021

44. K. Chadrashekar, J. Wilson, E. Erickson, Z. Feng, S. Mick, J Xu, and P.D. Franzon, "Inductively Coupled Connectors and Sockets for Multi-Gbps Pulse Signaling," in IEEE. Trans. Adv. Pack., Vol. 31, No. 4, Nov. 2008, pp. 749-758.

45. A.S. Blum, C.M. Soto, C.D. Wilson, C. Amsinck, P. Franzon, B.R. Ratna, "Electronic Properties of Molecular Memory Circuits on a Nanoscale Scaffold," in IEEE Trans NanoBioscience, 6(4), Dec. 2007, pp. 270-274.

46. S.R. Sonkusale, N.H. DiSpigna, P.D. Franzon, "Uniformity analysis of wafer scale sub-25 nm wide nanowire array nanoimprint mold fabricated by PEDAL process," in Microelectronic Engineering, 84(5-8), May-Aug 2007, pp. 1523-7.

47. H. Tao, H. Jianli, L. Meng, B. Chen, W. Reus, M. Notte, D.P. Nackashi, P.D. Franzon, J.M. Tour, "Controlled modulation of conductance in silicon devices by molecular monolayers," Journal of the American Chemistry Society, v. 128, no. 45, Nov 15, 2006, pp. 14537-14541.

48. L. Zhang, J.M. Wilson, R. Bashirullah, L. Luo, J. Xu, P.D. Franzon, "Voltage-Mode Driver Pre-emphasis technique for on-chip global buses," in IEEE Trans. VLSI, Vol. 15, No. 2, Feb. 2007, pp. 231-236.

49. M. Yuce, W. Liu, J. Damiano, B. Bharath, P.D. Franzon, N.S. Dogan, "SOI CMOS Implementation of a multirate PSK demodulator for space communications," IEEE Trans. Circuits and Systems I, Vol. 54, No. 2, Feb. 2007, pp. 420-431.

50. J.R. Reimers, N.M. Kriplani, D.P. Nackashi, C.J. Amsinck, N.H. DiSigna, M.B. Steer, P.D. Franzon, R.L. Rick, G.C. Solomon, "Physically based molecular device model in transient circuit simulator," in Chemical Physics, 326(1), July 2006, pp. 188-6.

51. Di Spigna, N., D. Nackashi, C. Amsinck, S. Sonkusale, and P. Franzon, "Deterministic Nanowire Fanout and Interconnect Without Any Translational Alignment", IEEE Transactions on Nanotechnology, Vol. 5, No. 4, July 2006, pp. 356-361.

52. L. Luo, J.M. Wilson, S.E. Mick, J. Xu, L. Zhang, P.D Franzon, "3 Gb/s AC coupled chip-to-chip communication using a low swing pulse receiver," IEEE JSSC, Vol. 41, No. 1, Jan 2006, pp. 287-296.

53. C. Amsinck, N. DiSpigna, D. Nackashi, P. Franzon, "Scaling constraints in nanoelectronic random-access memories," Nanotechnology 16(10), Oct. 2005, pp. 2251 – 2260.

54. W.R. Davis, J. Wilson, S. Mick, J. Xu, H. Hua, C. Mineo, A.M. Sule, M. Steer, P.D. Franzon , "Demystifying 3D ICs: the pros and cons of going vertical," IEEE Design and Test of Computers, Vol. 22, No. 6, Nov-Dec. 2005, pp. 498-510.

Petitioner Samsung Ex-1003, 0022

55. J. Nath, D. Ghosh, J.P. Maria, A.I. Kingon, W. Fathelbab,, P.D. Franzon, M.B. Steer, "An electronically tunable microstrip bandpass filter using thin-film Barium Strontium Titanate (BST) Varactors, in IEEE Transactoins on Microwave Theory and Techniques, Vol. 53, No. 9, Sept. 2005, pp. 2707 – 2712.

56. Sonkusale. S, Amsinck C. J, Nackashi D. P, Di Spigna N. H, Barlage D, Johnson M, Franzon P. D, " Fabrication of wafer-scale, aligned Sub-25 nm naowires and templates using Planar Edge Defined Alternate Layer (PEDAL) Process," Physica E. Low Dimensional Systems and Nanostructures, July 2005, pp. 107-114.

57. Amy Szuchmacher Blum, Carissa M. Soto, Charmaine D. Wilson, Tina L. Brower, Steven K. Pollack, Terence L. Schull, Anju Chatterji, Tianwei Lin, John E. Johnson, Christian Amsinck, Paul Franzon, Ranganathan Shashidhar, and Banahalli R. Ratna, "An Engineered Virus as a Scaffold for Three-Dimensional Self-Assembly on the Nanoscale," Small 1(7), July 2005, pp. 702-706.

58. P. Mehrotra, P. Franzon, "Optimal Chip Package Codesign for High Performance DSP," in IEEE Trans. Advanced Packaging, Vol. 28, No. 2, May 2005, pp. 288-297.

59. M. Aldwairi, T. Conte, P. Franzon, »Configureable string matching hardware for speeding up intrusion detection, » Computer Architecture News 33(1), pp. 99-107.

60. A.K. Varma, A. Glaser, and P.D. Franzon, "CAD flows for chip-package coverification," in IEEE Transactions on Advanced Packaging, Vol. 28, No. 1, February 2005, pp. 96-101.

61. R. Mohan, M.J. Choi, S.E. Mick, F.P. har, K. Chandrasekar, A.C. Cangellaris, P.D. Franzon, M. Steer, "Casual Reduced-order Modeling of Distributed Structures in a Transient Circuit Simulator," IEEE Trans. MTT, Vol. 52(9), Sept. 2004, pp. 2207-2214.

62. A.K. Varma, A.W. Glaser, and P.D. Franzon, "CAD Flows for Chip-Package CoVerification," IEEE Trans. Advanced Packaging, Vol. 28(1), Feb. 2005, pp. 194-202.

63. J. Xu, L. Luo, S. Mick, J. Wilson, P. Franzon, "AC Coupled Interconnect for Dense 3-D ICs, "AC Coupled Interconnect for Dense 3-D ICs," in IEEE Transactions on Nuclear Science (TNS). Vol. 51(5), Oct, 2004, pp. 2156-2160.

64. Seminario, J.M. Yufei Ma; Agapito, L.A.; Liuming Yan; Araujo, R.A.; Bingi, S.; Vadlamani, N.S.; Chagarlamudi, K.; Sudarshan, T.S.; Myrick, M.L.; Colavita, P.E.; Franzon, P.D.; Nackashi, D.P.; Long Cheng; Yuzing Yao; Tour, J.M., "Clustering effects on discontinuous gold film nano cells," Journal of Nanoscience and Nanotechnology, v 4, n 7, Sept. 2004, p 907-17.

65. M. Scheffler, P. Franzon, G. Troster, 'A defect level versus cost system tradeoff for Electronics Manufacturing,' in IEEE Trans. Electronics Packaging Manufacturing, C. Vol. 27, 1, Jan 2004, pp. 67-76.

Petitioner Samsung Ex-1003, 0023

66. M.R. Stan, P.D. Franzon, S.C. Goldstein, J.C. Lach, M. Zigler, "Molecular Electronics: from devices and interconnect to circuits and architecture," Proc. IEEE, 91(11), Nov. 2003, pp. 194-1957.

67. J.A. Palmer, J.F. Mullin, T. Usher, E. Grant, J.W. Eischen, A.I. Kingon, P.D. Franzon, "The Design and Characterization of a Novel Piezoelectric Transducer-Based Linear Motor," IEEE Trans. Mechatronics, Vol. 9, No. 2, June 2004, pp. 392-398.

68. S. Mick, L. Luo, J. Wilson, P. Franzon, "Buried Bump and AC Coupled Interconnection Technology, IEEE Trans. Adv.Packaging, 27(1), Feb, 2004, pp. 121-125.

69. J.T. Schaffer, A. Glaser, S. Lipa, and P. Franzon, "Chip Package Codesign of a Triple DES Processor," IEEE Trans. Advanced Packaging, 27(1), Feb. 2004, pp. 194-202.

70. J.M. Tour, L. Cheng, D.P. Nackashi, Y. Yao, A.K. Flatt, S.K. St. Angelo, T.E. Mallouk, P.D. Franzon, "Nanocell Electronic Memories," J. Am. Chem. Soc., 125, 13279-13282, 2003.

71. J.M. Seminario, et.al., "Clustering Effects on Discontinuous Gold Films," accepted by the Journal of Nanoscience and Nanotechnology.

72. J.M. Tour, W.L. Van Zandt, C.P. Husband, S.M. Husband, L.S. Wilson, P.D. Franzon, D.P. Nackashi, "Nanocell logic gates for Molecular Computing," IEEE Trans. Nano, 1(2), June 2002, pp. 100-109.

73. P. Mehrotra, P.D. Franzon, "Novel architecture for fast address lookups," IEEE Communications Magazine, 40(11), November 2002, pp. 66-71.

74. James M. Tour, William L. Van Zandt, Christopher P. Husband, Summer M. Husband, Eric C. Libby, Derek A. Ruths, Kenneth K. Young and Lauren S. Wilson, Paul D. Franzon and David P. Nackashi, "Nanocell Logic Gates for Molecular Computing," IEEE Transactions on Nanotechnology, 1(2), June 2002, pp. 100-109.

75. T. Usher, J. Manning, D. Dessent, J.A. Palmer, P. Franzon, E. Grant, and A. Kingon, "Load characterization of high displacement pizeoelectric actuators with various end conditions", Sensors and Actuators-A-(Physical), Vol. A94, No.1-2, Oct. 2001. pp.19-24.

76. Meshel AS, Nackashi DP, Franzon PD, Sheetz MP, Single force measurements on 3D collagen matrix" Biophysical Journal 82(1): 2002 Part 2 Jan 2002.

77. S. Gahide, G.L. Hodge, W. Oxenham, A.M. Sayam and P.D. Franzon, "Micromachines and textiles: matching two industries", Textile Asia, August 2000, pp. 58-68.

Petitioner Samsung Ex-1003, 0024

78. H.L. Lo, J.F. Kauffmann and P.D. Franzon, “High frequency loss and electromagnetic field distribution for striplines and microstrips", *IEEE Transactions on Components, Packaging and Manufacturing Technology*,Part B., Advanced Packaging, Vol. 22, No. 1, pp. 16-25, Jan. 1999.

79. S.F. Al-sarawi, D. Abbott, and P. Franzon, “A review of 3D Packaging Technology", *IEEE Transactions on Components, Packaging and Manufacturing Technology*, Feb. 1998, Vol. 21, No. 1, pp.2-14.

80. H.Y. Hseih, W. Liu, P. Franzon and R. Cavin III, ‘`Clocking Optimization and Distribution of Digital Systems with Scheduled Skews", *International Journal of VLSI Signal Processing*, April 1997, Vol. 16., pp.19-36.

81. P. Franzon, Andrew Stanaski, Yusuf Tekmen, Sanjeev Banerjia,”System Design Optimization for MCM-D/Flip-Chip", *IEEE Trans. on Components Packaging and Manufacturing Technology*, Part B, Vol. 18, 1995, No. 4, pp. 620-627.

82. S. Lipa, M.B. Steer, A.C. Cangellaris and P.D. Franzon, “Experimental Characterization of Transmission Lines in Thin-Film Multichip Modules," *IEEE Trans. on Components Hybrids and Manufacturing Technology* , Part A, Vol. 19, No. 1, Feb. 1996, pp. 74-82.

83. R.J. Evans and P.D. Franzon, Energy consumption modeling and optimization for SRAMs, *IEEE Journal of Solid State Circuits*, Vol. 30, no. 5, May 1995, pp. 571-579.

84. S. Mehrotra, Y. Tekmen, P. Franzon, and W. Liu, Stochastic Optimization Approach to Component Sizing for High Performance Circuits, Submitted for publication to *IEEE Transactions on Computer-Aided Design.*

85. S. Washabaugh, P.D. Franzon and H.T. Nagle, SABSA: Switching-Activity Based State Assignment , *International Journal of High Speed Electronics and Systems*, Vol. 5, No. 2 (1994),203-212.

86. M.S. Basel, M.B. Steer and P.D. Franzon , “Simulation of High Speed Interconnects Using a Hierarchical Packaging Simulator," *IEEE Trans. on Components Hybrids and Manufacturing Technology/AdvancedPackaging*.

87. Slobodan Simovich, Sharad Mehrotra, Paul Franzon and Michael Steer, Delay and Reflection Noise Macromodeling for Signal Integrity Management of PCBs and MCMs, in *IEEE Trans. CPMT*, Part B: Advanced Packaging, vol. 17, no. 1, Feb., 1994, pp. 15-21.

88. Doane and P. Franzon, The Case for MCMs, *in Semiconductor International*, April 1994, pp. 85--86.

Petitioner Samsung Ex-1003, 0025

89. S. Simovich, P.D. Franzon and M.B. Steer, Method for automated waveform analysis of transient in digital circuits, *Electronics Letters*, 15th April 1993, Vol. 29, No. 8, pp. 681 -693.

90. S. Lipa, M.B. Steer, A.S. Morris and P.D. Franzon, Comparison of methods for determining the capacitance of planar transmission lines with with application to multichip module characterization, *IEEE Trans. on Components Hybrids and Manufacturing Technology/Advanced Packaging* , May 1993.
91. S. Ma and P. Franzon: Energy Control in CMOS Buffers, *IEEE Journal of Solid State Circuits*, Vol. 29, No. 9, September 1994,pp. 1150--1153.

92. P. Franzon, and R. Evans, An MCM Design Process with Application to a Laptop Computer Design , April 1993, Vol. 26, No. 4, pp. 41--49, *IEEE Computer Magazine*.

93. Dalal, M. Lorenzetti, and P. Franzon, A Layout-Driven Yield Predictor and Fault Generator for VLSI , *IEEE Trans*. Semi. Manu.,February 1993 (Vol. 6, No. 1), pp. 77-82.

94. M.B. Steer, S.B. Goldberg and P.D. Franzon,"Comment on an accurate measurement technique for line properties, junction effects and dielectric and magnetic parameters," *IEEE Trans. Microwave Theory Tech*., February 1992.

95. Steven B. Goldberg, Michael B. Steer, Paul D. Franzon, and Jeffrey S. Kasten Experimental electrical characterization of interconnects and discontinuities in high speed digital systems , *IEEE Trans. CHMT* , Vol. 14, No. 4, December 1991.pp. 761-765.

96. Van den Bout, P. Franzon, J. Paulos, T. Miller III, W. Snyder, T. Nagle and W. Liu: Scalable VLSI implementations for neural networks, *Journal of VLSI Signal Processing*, Volume 1, pp. 367-385, April, 1990.
P. Franzon: Modeling interconnect yield in reconfigurable circuits, *Electronics Letters*, Volume 25, Number 18, pages 1225 - 1226, 31 August 1989.

97. P. Franzon and K. Eshraghian: Achieving ULSI through defect tolerance, in the *Int. J. of Computer Aided VLSI Design*, Volume 1, Number 1, 1989, pages 73 - 90.

98. M. Hatamian, L.A. Hornak, T. Little, S.K. Tewksbury and P.Franzon:Fundamental interconnection issues, *AT&T Technical Journal, July/August 1987*, Volume 66, Issue 4, pages 13 - 30.

99. S.K. Tewksbury, M. Hatamian, P. Franzon, L.A. Hornak, C.A. Siller,Jr., and V.B. Lawrence: FIR filters for high sample rate applications , *IEEE Communications*, Vol. 25, July 1987, pp. 62-72.

Petitioner Samsung Ex-1003, 0026

JOURNAL PUBLICATIONS, SUBMITTED

PEER REFEREED CONFERENCE PUBLICATIONS

1. P. Franzon *et al*., "Design for 3D Stacked Circuits," *2021 IEEE International Electron Devices Meeting (IEDM)*, San Francisco, CA, USA, 2021, pp. 3.5.1-3.5.4. doi: 10.1109/IEDM19574.2021.9720553. **Invited Paper.**

2. W. R. Davis, P. Franzon, L. Francisco, B. Huggins and R. Jain, "Fast and Accurate PPA Modeling with Transfer Learning," *2021 IEEE/ACM International Conference On Computer Aided Design (ICCAD)*, Munich, Germany, 2021, pp. 1-8. doi: 10.1109/ICCAD51958.2021.9643533. **Invited Paper.**

3. P. P. Ravichandiran and P. D. Franzon, "A Review of 3D-Dynamic Random-Access Memory based Near-Memory Computation," *2021 IEEE International 3D Systems Integration Conference (3DIC)*, Raleigh, NC, USA, 2021, pp. 1-6.

4. L. B. Baker, R. Patti and P. Franzon, "Multi-ANN embedded system based on a custom 3D-DRAM," *2021 IEEE International 3D Systems Integration Conference (3DIC)*, Raleigh, NC, USA, 2021, pp. 1-7

5. W. R. Davis, P. Franzon, L. Francisco, B. Huggins and R. Jain, "Fast and Accurate PPA Modeling with Transfer Learning," *2021 IEEE/ACM International Conference On Computer Aided Design (ICCAD)*, Munich, Germany, 2021, pp. 1-8.

6. P. Kashyap, W. S. Pitts, D. Baron, C. -W. Wong, T. Wu and P. D. Franzon, "High Speed Receiver Modeling Using Generative Adversarial Networks," *2021 IEEE 30th Conference on Electrical Performance of Electronic Packaging and Systems (EPEPS)*, Austin, TX, USA, 2021, pp. 1-3.

7. L. Francisco, P. Franzon and W. R. Davis, "Fast and Accurate PPA Modeling with Transfer Learning," *2021 ACM/IEEE 3rd Workshop on Machine Learning for CAD (MLCAD)*, Raleigh, NC, USA, 2021, pp. 1-6.

8. T. Nigussie, T. -H. Pan, S. Lipa, W. S. Pitts, J. DeLaCruz and P. Franzon, "Design Benefits of Hybrid Bonding for 3D Integration," *2021 IEEE 71st Electronic Components and Technology Conference (ECTC)*, San Diego, CA, USA, 2021, pp. 1876-1881

9. K. Bhanushali, W. Pitts, P. Franzon, “Embedded RFID for Chip Asset Tracking,” in Proc. Gomactech 2021.

Petitioner Samsung Ex-1003, 0027

10. T. Nigussie, J. Schabel, S. Lipa, L. McIlrath, R. Patti, P. Franzon, "Design Obfuscation through Smart Partitioning and 3D Integration – Experimental Results," in Proc. Gomactech 2021.

11. K. Bhanushali, W. Zhao, W. Pitts, P. Franzon, "A 125um x 245 um Mainly Digital UHF EPC Gen2 Compatible RFID tag in 55 nm CMOS process," in Proc. IEEE RFID, April, 2021. **Best paper award.**

12. F. Regazzoni *et al*., "Machine Learning and Hardware security: Challenges and Opportunities -Invited Talk-," *2020 IEEE/ACM International Conference On Computer Aided Design (ICCAD)*, San Diego, CA, USA, 2020, pp. 1-6.

13. B. Li, B. Jiao, C. -H. Chou, R. Mayder and P. Franzon, "CTLE Adaptation Using Deep Learning in High- speed SerDes Link," *2020 IEEE 70th Electronic Components and Technology Conference (ECTC)*, Orlando, FL, USA, 2020, pp. 952-955.

14. I. Turteltaub, G. Li, M. Ibrahim, P. Franzon, "Application of quantum machine learning to VLSI placement," in Proc. ACM/IEEE MLCAD, Nov. 2020. Pp.61-66.

15. L. Francisco, et.al, "Design rule checking with a CNN based feature extreactor," in Proc. ACM/IEEE MLCAD 2020,, Nov. 2020, p. 61-66.

16. Bowen Li, Paul Franzon, Naomi Price, Brandon Jiao, Geoff Zhang, Chi-Hsun Chao, "Self Evolution Cascade Deep Learning for SerDes Adaptive Equalization," in Proc. DesignCon 2020, San Jose Ca. **Won best paper award**.

17. T. R. Harris, W. R. Davis, S. Lipa, W. S. Pitts and P. D. Franzon, "Vertical Stack Thermal Characterization of Heterogeneous Integration and Packages," *2019 International 3D Systems Integration Conference (3DIC)*, Sendai, Japan, 2019, pp. 1-3.

18. Z. Wang, A. Chakrabortty, C. T. Kelley, X. Feng and P. Franzon, "Improved Numerical Methodologies on Power System Dynamic Simulation Using GPU Implementation," *2019 IEEE Power & Energy Society Innovative Smart Grid Technologies Conference (ISGT)*, Washington, DC, USA, 2019, pp. 1-5.

19. B. Huggins, W. R. Davis and P. Franzon, "Estimating Pareto Optimum Fronts to Determine Knob Settings in Electronic Design Automation Tools," *20th International Symposium on Quality Electronic Design (ISQED)*, Santa Clara, CA, USA, 2019, pp. 304-310.

20. S. Dey and P. D. Franzon, "An Application Specific Processor Architecture with 3D Integration for Recurrent Neural Networks," *20th International Symposium on Quality Electronic Design (ISQED)*, Santa Clara, CA, USA, 2019, pp. 183-190.

Petitioner Samsung Ex-1003, 0028

21. K. Bhanushali, W. Zhao and P. D. Franzon, "Design of a Rectifier-Free Near-Threshold UHF Gen2 RFID Tag using Dual-Phase RF-only Logic," *2018 IEEE SOI-3D-Subthreshold Microelectronics Technology Unified Conference (S3S)*, Burlingame, CA, USA, 2018, pp. 1-3.

22. L. B. Baker and P. Franzon, "Multi-ANN embedded system based on a custom 3D-DRAM," *2018 IEEE SOI-3D-Subthreshold Microelectronics Technology Unified Conference (S3S)*, Burlingame, CA, USA, 2018, pp. 1-2.

23. Y. Wang and P. D. Franzon, "RFIC IP Redesign and Reuse Through Surrogate Based Machine Learning Method," *2018 IEEE MTT-S International Conference on Numerical Electromagnetic and Multiphysics Modeling and Optimization (NEMO)*, Reykjavik, 2018, pp. 1-4.

24. E. J. Wyers, W. Qi and P. D. Franzon, "A robust calibration and supervised machine learning reliability framework for digitally-assisted self-healing RFICs," *2017 IEEE 60th International Midwest Symposium on Circuits and Systems (MWSCAS)*, Boston, MA, 2017, pp. 1138-1141.

25. V. Srinivasan *et al*., "H3 (Heterogeneity in 3D): A Logic-on-Logic 3D-Stacked Heterogeneous Multi-Core Processor," *2017 IEEE International Conference on Computer Design (ICCD)*, Boston, MA, 2017, pp. 145-152.

26. R. Widialaksono *et al*., "Physical design of a 3D-stacked heterogeneous multi-core processor," *2016 IEEE International 3D Systems Integration Conference (3DIC)*, San Francisco, CA, 2016, pp. 1-5.

27. B. Li and P. D. Franzon, "Machine learning in physical design," *2016 IEEE 25th Conference on Electrical Performance Of Electronic Packaging And Systems (EPEPS)*, San Diego, CA, 2016, pp. 147-150.

28. S. Dey, P. Franzon, “Design and ASIC Acceleration of Cortical Algorithm for text recognition,” in Proc. IEEE SOCC, Seattle WA, September, 2016

29. W. Li and P.D. Franzon, “Hardware implementation of Hierarchnical Temporal Memory Algorithm,” in IEEE SOCC, Seattle WA, September 2016.

30. T. R. Harris *et al*., "Thermal raman and IR measurement of heterogeneous integration stacks," *2016 15th IEEE Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm)*, Las Vegas, NV, 2016, pp. 1505-1510.

31. J. Schabel, L. Baker, S. Dey, W. Li and P. D. Franzon, "Processor-in-memory support for artificial neural networks," *2016 IEEE International Conference on Rebooting Computing (ICRC)*, San Diego, CA, 2016, pp. 1-8.

Petitioner Samsung Ex-1003, 0029

32. T. R. Harris, W. R. Davis and P. Franzon, "Novel packaging and thermal measurement for 3D heterogeneous stacks," *2016 International Symposium on 3D Power Electronics Integration and Manufacturing (3D-PEIM)*, Raleigh, NC, 2016, pp. 1-11.

33. T. Nigussie and P. D. Franzon, "RDL and interposer design for DiRAM4 interfaces," *2016 IEEE 25th Conference on Electrical Performance Of Electronic Packaging And Systems (EPEPS)*, San Diego, CA, 2016, pp. 17-20.

34. W. Zhao, K. Bhanushali and P. Franzon, "Design of a rectifier-free UHF Gen-2 compatible RFID Tag using RF-only logic," *2016 IEEE International Conference on RFID (RFID)*, Orlando, FL, 2016, pp. 1-6.

35. T. R. Harris *et al*., "Thermal simulation of heterogeneous GaN/ InP/silicon 3DIC stacks," *3D Systems Integration Conference (3DIC), 2015 International*, Sendai, 2015, pp. TS10.2.1-TS10.2.4.

36. P. D. Franzon *et al*., "Computing in 3D," *3D Systems Integration Conference (3DIC), 2015 International*, Sendai, 2015, pp. TS6.1.1-TS6.1.2 (invited)

37. P. Franzon *et al*., "Computing in 3D," *Custom Integrated Circuits Conference (CICC), 2015 IEEE*, San Jose, CA, 2015, pp. 1-6. (invited)

38. E. J. Wyers, T. R. Harris, W. S. Pitts, J. E. Massad and P. D. Franzon, "Characterization of the mechanical stress impact on device electrical performance in the CMOS and III–V HEMT/HBT heterogeneous integration environment," *3D Systems Integration Conference (3DIC), 2015 International*, Sendai, 2015, pp. TS8.27.1-TS8.27.4.

39. P. Franzon, et.al. “Computing in 3D”, EDSSC, Singapore, June 2015 (invited)

40. Priyadarshi, S.; Davis, W.R.; Franzon, P.D., "Pathfinder3D: A framework for exploring early thermal tradeoffs in 3DIC," *IC Design & Technology (ICICDT), 2014 IEEE International Conference on* , vol., no., pp.1,6, 28-30 May 20

41. Paul D. Franzon, Eric Rotenberg, James Tuck, Huiyang Zhou, W. Rhett Davis, Hongwen Dai, Joonmoo Huh, Sunkgwan Ku, Steve Lipa, Chao Li, Jong Beom Park, Joshua Schabel “3DEnabled Customizable Embedded Computer (3DECC)” in Proc. 2014 IEEE 3DIC Conference.

42. T Robert Harris, Lee Wang, Paul Franzon and W Rhett Davis, “Thermal effects of heterogeneous interconnects on InP / GaN / Si diverse integrated circuits.”, in Proc. 2014 IEEE 3DIC Conference.

43. Randy Widialaksono, Wenxu Zhao, William Rhett Davis and Paul D. Franzon, “Leveraging Leveraging 3D-IC for On-chip Timing Uncertainty Measurements,” in Proc. 2014 IEEE 3DIC Conference.

Petitioner Samsung Ex-1003, 0030

44. Franzon, P.D.; Rotenberg, E.; Tuck, J.; Davis, W.R.; Huiyang Zhou; Schabel, J.; Zhang, Z.; Park, J.; Dwiel, B.; Forbes, E.; Joonmoo Huh; Priyadarshi, S.; Lipa, S.; Thorolfsson, T., "Applications and design styles for 3DIC," *Electron Devices Meeting (IEDM), 2013 IEEE International* , vol., no., pp.29.4.1,29.4.4, 9-11 Dec. 2013 (invited paper)

45. Franzon, P.; Bar-Cohen, A., "Thermal requirements in future 3D processors," *3D Systems Integration Conference (3DIC), 2013 IEEE International* , vol., no., pp.1,6, 2-4 Oct. 2013 (Invited Paper)

46. Franzon, P., "Design and test of 2.5D and 3D stacked ICs," *Electrical Performance of Electronic Packaging and Systems (EPEPS), 2013 IEEE 22nd Conference on* , vol., no., pp.vii,vii, 27-30 Oct. 2013

47. Suh, E.J.; Franzon, P.D., "Design of 60 GHz contactless probe system for RDL in passive silicon interposer," *3D Systems Integration Conference (3DIC), 2013 IEEE International* , vol., no., pp.1,5, 2-4 Oct. 2013

48. Zhenqian Zhang; Franzon, P., "TSV-based, modular and collision detectable face-to-back shared bus design," *3D Systems Integration Conference (3DIC), 2013 IEEE International* , vol., no., pp.1,5, 2-4 Oct. 2013

49. Zhenqian Zhang; Noia, B.; Chakrabarty, K.; Franzon, P., "Face-to-face bus design with built-in self-test in 3D ICs," *3D Systems Integration Conference (3DIC), 2013 IEEE International* , vol., no., pp.1,7, 2-4 Oct. 2013

50. Rotenberg, E.; Dwiel, B.H.; Forbes, E.; Zhenqian Zhang; Widialaksono, R.; Basu Roy Chowdhury, R.; Tshibangu, N.; Lipa, S.; Davis, W.R.; Franzon, P.D., "Rationale for a 3D heterogeneous multi-core processor," *Computer Design (ICCD), 2013 IEEE 31st International Conference on* , vol., no., pp.154,168, 6-9 Oct. 2013

51. Tshibangu, N.M.; Franzon, P.D.; Rotenberg, E.; Davis, W.R., "Design of controller for L2 cache mapped in Tezzaron stacked DRAM," *3D Systems Integration Conference (3DIC), 2013 IEEE International* , vol., no., pp.1,4, 2-4 Oct. 2013

52. Franzon, P.D., "MOOCs, OOCs, flips and hybrids: The new world of higher education," *Microelectronic Systems Education (MSE), 2013 IEEE International Conference on* , vol., no., pp.13,13, 2-3 June 2013 (Invited Paper)

53. Franzon, P.D.; Priyadarshi, S.; Lipa, S.; Davis, W.R.; Thorolfsson, T., "Exploring early design tradeoffs in 3DIC," *Circuits and Systems (ISCAS), 2013 IEEE International Symposium on* , vol., no., pp.545,549, 19-23 May 2013 (invited paper)

54. Karim, M.A.; Franzon, P.D.; Kumar, A., "Power comparison of 2D, 3D and 2.5D interconnect solutions and power optimization of interposer interconnects," *Electronic*

Petitioner Samsung Ex-1003, 0031

Components and Technology Conference (ECTC), 2013 IEEE 63rd , vol., no., pp.860,866, 28-31 May 2013

55. Wenxu Zhao; Gadfort, P.; Erickson, E.; Franzon, P.D., "A compact inductively coupled connector for mobile devices," *Electronic Components and Technology Conference (ECTC), 2013 IEEE 63rd* , vol., no., pp.2385,2390, 28-31 May 2013

56. Zhuo Yan; Franzon, P.D.; Aygun, K.; Braunisch, H., "Circuit/channel co-design methodology for multimode signaling," *Electronic Components and Technology Conference (ECTC), 2013 IEEE 63rd* , vol., no., pp.1356,1361, 28-31 May 2013

57. Priyadarshi, S.; Choudhary, N.K.; Dwiel, B.; Upreti, A.; Rotenberg, E.; Davis, R.; Franzon, P., "Hetero^2 3D integration: A scheme for optimizing efficiency/cost of Chip Multiprocessors," *Quality Electronic Design (ISQED), 2013 14th International Symposium on* , vol., no., pp.1,7, 4-6 March 2013

58. Franzon, P.D.; Priyadarshi, S.; Lipa, S.; Davis, W.R.; Thorolfsson, T., "Exploring early design tradeoffs in 3DIC," *Circuits and Systems (ISCAS), 2013 IEEE International Symposium on* , vol., no., pp.545,549, 19-23 May 2013

59. G Charles, P. Franzon, "Comparison of TSV-based PDN design effects using various tacking topology methods," in Proc. 21st EPEPS, 2012, pp. 83-86.

60. M. Yelten, P. Franzon, M. Steer, "Process mismatch analysis based on reduced-order models," in Proc. 13th ISQED, 2012, pp. 648-655.

61. P. Franzon, W. Davis,. Z. Zhen, S. Priyadarshi, M. Hogan, T. Karnik, G. Srinivas, "Coordinating 3D designs: Interface IP, standards or free-form?," in Proc. 2011 IEEE 3DIC Conference, 2012. Invited Paper.

62. N. DiSpigna, D. Schinke, S. Jayant, V. Misra, and P. Franzon, "A novel double floating-gate unified memory device," in 20th IEEE/IFIP VLSI-SOC, pp. 53-58. 2012. Won Conference Best Paper Award.

63. Z. Yan, C. Won, P. Franzon, K. Aygun, H. Braunisch, "S-parameter based multimode signaling," in Proc. 21st EPEPS, pp. 11-14, 2012.

64. S. Priyadarshi, J. Hu, W. Choi, S. Melamed, X. Chen, W. Davis, P. Franzon, "Pathfinder 3D: A flow for system level design space exploration," in Proc. 2011 IEEE 3DIC Conference, January, 2012.

65. T. Thorolfsson, S. :Lipa, P. Franzon, "A 10.35 mW/GFLOP stacked SAR DSP unit using fine-grain partitionined 3D integration," in 2012 IEEE CICC, pp. 1-4, 2012.

Petitioner Samsung Ex-1003, 0032

66. P. Gadfort, P. Franzon, "Design, modeling and fabrication of mm3 three-dimensional integrated antennas," in Proc. 62nd IEEE ECTC, pp. 1794-1799, 2012.

67. J. Ledford, P. Gadfort, P. Franzon, "An analysis of subthreshold SRAM bitcells for operation in low power RF-only technologies," in 2012 IEEE SubVT Conference, pp. 1-3, 2012.

68. P. Gadfort, P. Franzon, "Near threshold RF-only analog to digital converter," in IEEE SubVT Conference, pp. 1-3, 2012.

69. P. Franzon, En-Xiao, "Design Strategies for Chip/Package Codesign," in Proc. 2011 IEEE EPEPS, 2011, pp. 15-16.

70. P.D. Franzon, W.R. Davis, T. Thorolfsson, S. Melamed, "3D Specific Systems: Design and CAD," in 20th Asian Test Symposium, 2011, pp. 470-473. (Invited).

71. X. Chen, W.R. Davis, P.D. Franzon, "Adaptive Clock Distribution for 3D Integrated Circuits," in Proc. 2011 IEEE EPEPS, 2011, pp. 91-94.

72. P.D. Franzon, W.R. Davis, T. Thorolfsson, S. Melamed, "3D Specific Systems Design and CAD," in 2011 Int. Conf on Embedded Computer Systems," 2011, pp. 326-329.

73. G. Charles, P.D. Franzon, J. Kim, A. Levin, "Analysis and approach of TSV-based hierarchical power distribution for estimating 1st droop and resonant noise in 3DIC," in 2011 IEEE EPEPS, 2011, pp. 267-270.

74. P. Franzon, J. Wilson, L. Ming, "Thermal Isolation in 3D Chip Stacks Using Vacuum gaps and Capacitive or Inductive Communications," in IEEE 3DIC 2010, pp.1-4.

75. S. Lipa, T. Thorolfsson, and P. Franzon, "The NCSU Tezzaron Design Kit," in IEEE 3DIC 2010, pp. 1-15.

76. T. Thorolfsson, L Guojie, J. Cong, and P. Fraqnzon, "Logic-on-logic 3D Integration and Placement," in IEEE 3DIC 2010, pp. 1-4.

77. S. Melamed, T. Thorolfsson, A. Srinivasan, E. Cheng, P. Franozn and W.Davis, "Thermal Investigatoin of Tier Swapping to Improve the Thermal Profile of Memory-on-Logic 3DICs,", in IEEE THERMINIC 2010, pp. 1-6.

78. B. Su, W.S. Pitts, P.D. Franzon and J. Wilson, "A Zero Power Consumption Multi-Capacitor Structure for Voltage Summing in High-Speed FFE," in 2010 EPEP, pp. 13-16.

79. Y. Choi, H. Braunisch, K. Aygun, P. Franzon, "Multimode Transceiver for High-Density Interconnects: Measurement and Validation", in Proc. 2010 ECTC, May, 2010.

Petitioner Samsung Ex-1003, 0033

80. N. DiSpigna, P. Chakraborti, D. Winick, P. Yang, T. Ghosh, P. Franzon "The Integration of Novel EAP-Based Braille Cells for Use in a Refreshable Tactile Display," Proc. SPIE, v. 7642, 2010 (9 pp).

81. S. Melamed, T. Thorolfsson, A. Srinivasan, E. Cheng, P. Franzon, R. Davis, "Junction Level Thermal Extraction and Simulation of 3DICs," in Proc. IEEE 3D System Integration Conference, September, 2009.

82. T. Thorolffson, K. Gonsalves, P.D. Franzon, "Design Automation of a 3DIC FFT Processor, for Synthetic Aperture Radar: A case study," in Proc. ACM/IEEE DAC 2009, pp. 51-56.

83. E. Erickson, J. Wilson, K. Chadrasekar, P.D. Franzon, "Multi-bit fractional equalization for multi-Gb/s inductively coupled connectors," in Proc. IEEE EPEPS, Oct. 2009, pp. 121-24.

84. M. Tsai, A. Klooz, A. Leonard, J. Appel, P. Franzon, "Through Silicon Via (TSV) defects/pinhole self test circuit for 3D-IC," in Proc. IEEE 3D System Integration Conference, September, 2009.

85. E. Oh, P. Franzon, "Technology Impact Analysis for 3D TCAM," in Proc. IEEE 3D System Integration Conference, September, 2009.

86. P. Gadfort, P.D. Franzon, "Low-power self-equalizing driver for silicon carrier interconnects with low bit-error rate," in Proc. IEEE EPEPS, Oct. 2009, pp. 37-40.

87. P. Franzon, W. Davis, T. Thorolffson, "Creating 3D Specific systems: Architecture, design and CAD," in Proc. DATE 2010, pp. 1684-1688. Invited Paper.

88. T. Zhu, P.D. Franzon, "Application of surrogate modeling to generate compact and PVT-sensitive IBIS models," in Proc. IEEE EPEPS 2009, pp. 77-80.

89. N. DiSpigna, P. Chakraboorti, D. Winick, P. Yang, T. Ghosh, P. Franzon, " The integration of novel EAP-based Braille cells for use in a refreshable tactile display," in Proc. SPIE, v. 7642, p. 76420a (9 PP), March, 2010.

90. P. Franzon, W. Davis, M. Steer, T. Thorolfsson, L. McIlrath, and K. Obermiller, "CAD and Design Application Exploration of 3DICs," in Proc. 2008 Gomactech, April 2009.

91. M. Hamlett, L. McIlrath, F. Kiamilev, V. Ozguz, "CryptoFSM – Securing chips against reverse engineering," in Proc. 2008 Gomactech, April 2009.

92. N. DiSpigna, P. Chakraborti, P. Yang, T. Ghosh, and P. Franzon, "Application of EAP materials towards a refreshable Braille display," in Proc. SPIE 3275, (9 pp) April 2009.

Petitioner Samsung Ex-1003, 0034

93. P. Franzon, S. Lipa, E. Oh, T. Thorolfsson and W.R. Davis, ”Memory rich applicatons for 3D integration,” in Proc SPIE 7268, Smart Structures, Devices and Systems IV, Dec. 2008, (5 pp) Invited Paper.

94. Paul D. Franzon, William Rhett Davis, Michael B. Steer, Hua Hao, Steven Lipa, Sonali Luniya, Christopher Mineo, Julie Oh, Ambirish Sule, Thor Thorolfsson, “Application and Design Exploration for 3D Integrated Circuits,” VLSI Multi-level Interconnect Conference, September 2008, Invited paper.

95. W.R. Davis, A.M. Sule and P.D. Franzon, “An 8192-point fast fourier transform 3D-IC case study, in Proc. 51st Midwest Symposium on Circuits and Systems, Aug. 2008, pp. 438-441.

96. Y. Choi, C. Won, P.D. Franzon, H. Braunisch, and K. Aygun,“Multimode signaling on non-ideal channels,“ in IEEE EPEP 2008, Oct. 2008, pp. 51-54.

97. B. Su, P. Patel, S.W. Hunter, M. Cases, and P.D. Franzon, “AC coupled backplane communication using embedded capacitor,” in IEEE EPEP 2008, Oct. 2008, pp. 295-298.

98. Y. Choi, H. Braunish, K. Aygun and P.D. Franzon, “Analysis of inter-bundle crosstalk in multimodel signaling for high density interconnect,” in Proc. 2008 Electronic Components and Technology Conference, pp. 664-668, May 2008.

99. R. Puri, D. Varma, D. Edwards, P. Franzon, S. Kosonocky, A>J. Weger, A. Yang, “Keeping hot chips cool: are IC thermal problems hot air?”, in Proc. IEEE DAC, pp. 634-5, June 2008.

100. P.D. Franzon, et.al., “Design and CAD for 3D Integrated Circuits”, IEEE/ACM Design Automation Conference, June 2008. (Invited Session). pp. 668-673.

101. M. Yadav, R. Jenkal, P. Franzon, P. Lafucci, B. Potts, I. Burgess, „Application Specific Integrated Circuit Verification: An Illustration Based Approach,“ in IEEE MSE, May. 2008.

102. P. D. Franzon, et.al., “Computer-Aided Design and Application Exploration for 3D Integrated Circuits,” in GOMACTECH, April, 2008.

103. W.S. Pitts, M. Vaidya, M. Kadambi, S. Malkani, P.D. Franzon, “Autonomous Vision Processing and 3D Scene Reconstruction,” in GOMACTECH, April, 2008.

104. W.S. Pitts, V. Devasthali, J. Damiano, P.D. Franzon, “Extreme Temperature Invariant Circuitry Through Adaptive Body Biasing,” in GOMACTECH, April, 2008.

105. Paul D. Franzon, William Rhett Davis, Michael B. Steer, Hua Hao, Steven Lipa, Sonali Luniya, Christopher Mineo, Julie Oh, Ambirish Sule, Thor Thorolfsson,

Petitioner Samsung Ex-1003, 0035

"Application and Design Exploration for 3D Integrated Circuits," VLSI Multi-level Interconnect Conference, September 2007, Invited paper.

106. T. Thorolfsson, P.D. Franzon, "System Design for 3D Multi-FPGA Packaging," in IEEE Electrical Performance of Electronic Packaging, 2007, Oct, 2007, pp. 171-174.

107. A. Varma, M. Steer, P. Franzon, "System level Validation of Improved IO Buffer Behavioral Modeling Methodology Based on IBIS," in IEEE Electrical Performance of Electronic Packaging, 2007, Oct, 2007, pp. 351-354.

108. E.C Oh, P.D. Franzon, "Design Considerations and Benefits of Three-Dimensional Ternary Content Addressable Memory, in IEEE CICC, Sept. 2007, pp. 591-594.

109. P.D. Franzon, W.R. Davis, M.B. Steer, H. Hao, S. Lipa, C. Mineo, J. Oh, A. Sule, T. Thorolfsson, "Design for 3D Integration an Applications," ISSSE '07, August, 2007, pp. 263-266. Invited Paper.

110. P. Franzon, C. Amsinck, N.H. DiSPigna, D. Nackashi, S. Sonkusale, "Molecular Electronics," in the 2nd IEEE International Workshop on advances in sensors and interfaces," Invited Paper, June 2007.

111. J.E. Stine, I. Castellanos, M. Wood, J. Henson, F. Love, W.R. Davis, P.D. Franzon, M. Bucher, S. Basavarajalah, J. Oh, R. Jenkal,"FreePDK: An Open-Source Variation-Aware Design Kit," in IEEE MSE 2007, June, 2007, pp. 173-174.

112. M. Yadav, A. Venkatachaliah, P.D. Franzon, "Hardware Architecture of a Parallel Pattern Matching Engine," in Proc. ISCAS 2007, pp. 1369-1372.

113. U. Pazhayaveetil, D. Chandra and P. Franzon, "Flexible Low Power Probability Density Estimation Unit for Speech Recognition," in Proc. ISCAS 2007, pp. 1117-1120.

114. O-E Chu, P. Franzon, "TCAM core design in 3D IC for low matchline capacitance and low power," Proc. SPIE Smart Structures, Devices and Systems III, 2006, Invited Paper, pp. 641-5.

115. Liang Zhang, John Wilson, Rizwan Bashirulla, Lei Luo, Jian Xu, and Paul Franzon, "A 32Gb/s On-chip Bus with Driver Pre-emphasis Signaling" in by Proc. Custom Integrated Circuits Conference (CICC) 2006, Sept. 2006, pp.265-268.

116. L. Luo, J. Wilson, S. Mick, J. Xu, L. Zhang, E. Erickson, P. Franzon, *"A 36Gb/s ACCI Multi-Channel Bus using a Fully Differential Pulse Receiver"*, in Proceedings of the IEEE,Custom Integrated Circuits Conference, 2006, Sept. 2006, pp.773-776.

117. J. Xu, J. Wilson, E. Erickson, P. Franzon, "Pulse Signaling in Inductively Coupled Sockets and Connectors", in SRC Student Symposium, Oct. 2006, Paper 13.2.

Petitioner Samsung Ex-1003, 0036

118. D. Chandra, U. Pazhayaveetil, P.D. Franzon, "Architecture for Low Power Large Vocabulary Speech Recognition," in Proc. IEEE Int. SOC Conference, Sept. 2006, pp. 25-28.

119. S. Sonkusale, P. Franzon, "Controlled nanowire fabrication by PEDAL process," invited paper, in Proc. IEEE NanoNet '06, Sept. 2006, pp. 1-8.

120. K. Chandrasekar, J. Wilson, E. Erickson, Z. Feng, J. Xu, S. Mick, P. Franzon, "Fine pitch inductively coupled connectors for multi-Gbps pulse signaling," in Proc. IEEE Electrical Performance of Electronic Packaging, Oct. 2006, pp. 11-14.

121. A. Varma, M. Steer, P. Franzon, "Developing improved IO buffer behavioral modeling methodology based on IBIS," in Proc. IEEE Electrical Performance of Electronic Packaging, Oct. 2006, pp. 69-72.

122. T-H, Kang, C. Merritt, B. Karaguzel, J. Wilson, P. Franzon, B. Pourdeyhimi, E. Grant, T. Nagle, « Sensors on textile substrates for home-based healthcare monitoring, » in 1st. Conf. on Distributed Diagnosis and Home Healthcare, 2006, pp. 5-7.

123. J. Wilson, L. Luo, S. Mick, B. Chan, H. Lin, P. Franzon, *"AC Coupled Interconnect using Buried Bumps for Laminated Organic Packages"*, in Proc. Electronic Components and Technology, ECTC, May/June, 2006.

124. J.M. Wilson, S. E. Mick, J. Xu, L. Luo, E. L. Erickson, P.D. Franzon, *"Considerations for Transmission Line Design on MCMs using AC Coupled Interconnect with Buried Solder Bumps"*, in Proc. 10th Annual Workshop on Signal Propagation on Interconnects, Berlin, Germany, May 2006, pp. 281-282.

125. J.M. Wilson, C.R. Merritt, B. Karaguzel, T. Kang, H.T. Nagle, E. Grant, B. Pourdeyhemi, P.D. Franzon, *"High-Frequency Characterization of Printed CPW Lines on Textiles using a Custom Test Fixture"*, 10th Annual Workshop on Signal Propagation on Interconnects, Berlin, Germany, May 2006, pp. 279-280.

126. L. Luo, J. Wilson, J. Xu, S. Mick, P. Franzon, "Signal integrity and robustness of ACCI packaged systems," in Proc. IEEE EPEP, Oct. 2005, pp. 11-14.

127. L. Zhang, J. Wilson, R. Bashirullah, P. Franzon,"Differential current mode signalling for robust and power efficient on-chip global interconnect," in Proc. EPEP, Oct. 2005, pp. 315-318.

128. L. Zhang, J. Wilson, R. bashirullah, L. Luo, J. xu, P. Franzon, "Driver pre-emphasis for on-chip global buses," in Proc. 2005 Int. symposium on Low Power Electronics and Design, Aug., 2005, pp. 186-191.

Petitioner Samsung Ex-1003, 0037

129. J. Xu, E. Grant, A.I. Kingon, J.M. Wilson, and P. Franzon, "Drive Circuit for a Mode Conversion Rotary Ultrasonic Motor," in Annual Conference of the IEEE Industrial Electronics Society, November, 2005, pp. 186-191.

130. P. Franzon, D. Nackashi, N.Dispigna, S. Sonkusle, "Molecular electronics – devices and circuits technology," in Proc. IFIP VLSI-SoC 2005, pp. 57-63. (Invited Paper).

131. D.P. Nackashi, C.J. Amsinck, N.H. DiSPigna, P.D. Franzon, "Molecular electronic latches and memories," in IEEE Nano, 11-15 July, 2005, pp. 819-822.

132. N.S. Dogan, P. Franzon, W. Liu, "Impact of SOI research Project on microlectronics education: a case study," IEEE Int. conf. on Microelectronics systems education, June 2005, pp. 33-34.

133. J. Nath, D. Ghosh, W. Fathelbab, J. Maria, A. Kingon, P. Franzon, M.B. Steer, "A Tunable combline bandpass filter using barium strontium titanate interdigital varactors on alumina substrate," IEEE 2005, MTT-S, June 2005, pp. 595-598.

134. J. Xu, J. Wilson, S. Mick, L. Luo,"2.8 Gbps inductively coupled interconnect for 3D ICs," 2005 symposium on VLSI circuits, June 2005, pp. 352-355.

135. K. Chandrasekar, Z. Feng, J. Wilson, S. Mick, P. Franzon,"Inductively Coupled Board to Board Connectors," ECTC'05, 31 May – 3 June, 2005, pp. 1109-1113.

136. J. Xu, J. Wilson, S. Mick, L. Luo and P. Franzon, "2.8 Gb/s Inductively Coupled Interconnect for 3-D ICs," in Japan VLSI Symposium, June, 2005.

137. K. Chandrasakar, Z. Feng, J. Wilson, S. Mick, P. Franzon, "Inductively Coupled Board-to-Board Connectors," in ECTC 2005, May 2005.

138. J. Wilson, R. Bashirullah, D.P. Nackashi, D.A. Winick, and P.D. Franzon, "An integrated self-masking technique for providing low-loss metallized RF MEMS devices in a polysilicon only MEMS process", invited paper, SPIE Micro Europe, Sevilla, Spain, May 2005.

139. Sonkusale. S, Amsinck C. J, Nackashi D. P, Di Spigna N. H, Barlage D, Johnson M, Franzon P. D, " Fabrication of wafer-scale, aligned Sub-25 nm naowires and templates using Planar Edge Defined Alternate Layer (PEDAL) Process," NSTI, Anaheim CA, May 2005.

140. L. Luo, J. M. Wilson, S.E. Mick, J. Xu, L. Zhang, and P.D. Franzon, "A 3 Gb/s AC Coupled Chip-to-Chip Communication," 2005 International Solid State Circuits Conference, San Francisco, Feb. 2005.

Petitioner Samsung Ex-1003, 0038

141. M. Aldwairi, T. Conte, P. Franzon, "Configureable String matching hardware for speeding up intrusion detection," ACM Workshop on secure networking, Boston, Oct, 2004.

142. M. Yadav, P. Hamilton, R. Sears, Y. Viniotis, T. Conte, P.D. Franzon, "A configurable classification engine for polymorphous chip architecture," ACM BEACON Workshop, Boston, OCT. 2004.

143. J. Damiano, P. Franzon, "Integrated dynamic body contact for H-gate PD-SOI Mosfets for high performance / low power," Proc. IEEE SOI Conference, 4-7 OCT, 2004, pp. 115-6.

144. M.r. Yuce, W. Liu, B. Bharat, J. Damaino, P.D. Franzon, "The performance and experimental results of a multiple bit rate symbol timig recovery circuit fir PSK receivers," proc. IEEE Custom Integrated Circts Conference, 3-6 Oct, 2004, pp. 591-4.

145. A. Varma, S. Lipa, A. Glaser, M. Steer, P. Franzon, "Simultaneous switching noise in IBIS models," invited paper, Proc. IEEE Electromagnetic compatibility Conference, 9-13 Aug 2004, pp. 1000-4, vol. 3.

146. A. Varma, M. Steer, P. Franzon, "SSN isues with IBIS models," proc. IEEE Electrical performance of electronic Packaging, Oct. 2004, pp. 87-90.

147. A. Varma, A. Glaser, P. Franzon, "CAD flows for chip-package codesign," Proc. IEEE Electrical Performance of Electronic Packaging," Oct. 2003, pp. 11-14.

148. J.A. Palmer, J.F. Mulling, B. Dessent, E. Grant, J.W. Eischen, A. Gruverman, A. Kingon, P.D. Franzon, "The Design, Fabrication and Characterization of Millimeter Scale Motors for Miniature Direct Drive Robots," Proc. IEEE International Conference on Robotics and Automation '04, April 2004, pp. 4668-4673.

149. M.R. Yuce, W. Liu, J. Damiano, B. Bharat, P.D. Franzon, N.S. Nugan, "A low power PSK receiver for space applications in 0.35 μm CMOS," Proc. IEEE Custom Integrated Circuits Conference, Sept. 2003, pp. 155-158.

150. L. Zhang, W. Liu, R. Bashirullah, J. Wilson, and P. Franzon, "Simplified delay design guidelines for on-chip global interconnects," GLSVLSI, proc. of ACM, pp.29-32, April 2004.

151. A. Varma, A. Glaser, S. Lipa, M.Steer, P. Franzon, "The development of a macro-modeling tool to develop IBIS models," Proc. IEEE Electrical Performance of Electronic Packaging, Oct. 2003, pp. 177-280.

152. Paul Franzon, Angus Kingon, Stephen Mick, John Wilson, Lei Luo, Karthik Chandrasakhar, Jian Xu, Salvatore Bonafede, Alan Huffman, Chad Statler, Richard LaBennett, Invited Paper, "High Frequency, High Density Interconnect Using AC Coupling," Fall MRS Conference, Boston MA, December 2003.

Petitioner Samsung Ex-1003, 0039

153. Paul Franzon, Stephen Mick, John Wilson, Lei Luo, Karthik Chandrasakhar, Invited Paper, "AC Coupled Interconnect for High-Density High-Bandwidth Packaging" Proc. SPIE, Microlectronics: Design, Technology and Packaging, Perth, Australia, December 2003. pp 67-69.

154. Paul Franzon, Stephen Mick, John Wilson, Lei Luo, Karthik Chandrasakhar, Invited Paper, "AC Coupled Interconnect for High-Density High-Bandwidth Packaging," Japan SSDM, Tokyo, Japan, September, 2003.

155. Jian Xu, Stephen Mick, John Wilson, Lei Luo, Karthik Chandrasakhar, Paul Franzon, "AC Coupled Interconnect for Dense 3-D Systems", Proc. IEEE Conference on Nuclear Science and Imaging, Seattle Washington, October 2003.

156. P. Franzon, C. Amsinck, N. Di Spigna, Sachin Sonkusale, and D. Nackashi, "Integration for Molecular Electronics," Invited Paper, Conference on Foundations of NanoScience, Snowbird, UT, April 2004.

157. M. Nakkar, P. Franzon, "Low power logical element for FPGA fabric," IEEE Int. Conference on Microelectronics, Dec. 2002, pp. 55-57.

158. S. Mick, L. Luo, J. Wilson, P. Franzon, "Buried solder bump connections for high-density capacitive coupling," IEEE Electrical Performance of Electronic Packaging, 2002, pp. 205-208.

159. P. Mehortra, P. Franzon, "Binary Search Schemes for Fast IP Lookups," IEEE Globecom, November, 2002, pp. 2005-2009.

160. S. Mick, P. Franzon, A. Huffman, Packaging Technology for AC Coupled Interconnection, IMAPS Flip-Chip Conference, July 2002.

161. P. Franzon, C.J. Amsinck, D.P. Nackashi, N. DeSpagna, "Scalable Molecular Circuit Architectures," Invited Paper, 2002 Engineering Foundation Conference on Molecular Computing, Key West, December 2002.

162. S.E. Mick, L. Luo, J.M. Wilson, P.D. Franzon, "Buried Solder Bump Connections for High-Density Capacitive Coupling," IEEE Electrical Performance on Electornic Packaging, October, 2002.

163. S. E. Mick, J. M. Wilson, and P. Franzon, "4 Gbps AC Coupled Interconnection," (invited paper), IEEE Custom Integrated Circuits Conference, May 12-16, 2002, pp. 133-140.

164. P. Mehortra, P. Franzon, "Novel Hardware Implementation for Fast Address Lookups," in 2002 Workshop on High Performance Switching and Routing, May 26-29, Kobe Japan.

Petitioner Samsung Ex-1003, 0040

165. P. Mehrotra, I. Baldine, D. Stevenson, and P. Franzon, "Network Processor Design for Optical Burst Switched Networks," Proc. 14th Annual IEEE International ASIC/SOC Conference, 2001., pp. 296-300.

166. J. Mulling, T. Usher, B. Desent, J. Palmer, P. Franzon, E. Grant, A. Kingon, "High displacement piezoelectric actuators: characterization at high load with controlled end conditions," Proc. 12th IEEE Int. Symp. On Applications of Ferroelectrics, 2000, pp. 745-748.

167. P. Franzon, "The Future of Molecular Electronics," Panel Session, International Conference on Computer Aided Design of Integrated Circuits, 2001.

168. D. Nackashi and P. Franzon, "Moletronics: A circuit design perspective," SPIE Smart Electronics and MEMS, International Conference in, Melbourne Australia, 2000, Proc. SPIE, Vol. 4236; 2000, pp.80-88.

169. John Wilson, Rizwan Bashirullah, David Nackashi, David Winick, Bruce Duewer, Paul D. Franzon, "Design of rotating MEMS tunable capacitors for use at RF and Microwave frequencies", in Proc. SPIE International Symposium on Microelectronics and MEMS, 17 - 19 December 2001 Adelaide, Australia.

170. B. Duewer, D. Winick, A. Oberhofer, J. Muth, P. Franzon, "Improving Interconnect Characteristics of Thin Film MEMS Processes,", in Proc. SPIE International Symposium on Microelectronics and MEMS, 17 - 19 December 2001 Adelaide, Australia.

171. J. Wood, S. Lipa, P. Franzon and M. Steer, "Multi-gigahertz low-power low-skew rotary clock scheme," Proc. International Conference On Solid State Circuits, 2001, pp. 400-401, 470.

172. P. Mehrotra, V. Rao, T. Conte, P. Franzon, "Leveraging high density packaging for high performance DSP systems", IEEE Electrical Performance on Electronic Packaging, 2000, pp. 25-28.

173. P.D. Franzon, B. Duewer, J. Wilson and D.A. Winick, "Programmable MEMS Capacitor Arrays", in Proc. SPIE Int. *Symposium on Microelectronics and Micromechanical System*s, November, 1999.

174. R. Pomerleau, G. Bilbro, and P. Franzon, "Improved delay prediction for on-chip buses," *Proceedings 1999 Design Automation Conference (Cat. No. 99CH36361). IEEE*, Piscataway, NJ, USA; 1999; xxxii+1003 pp. p.497-501.

175. P. Franzon, "Accuracy Issues in Full-Chip Extraction", Panel Session Chair and Organizer, DAC 1999.

Petitioner Samsung Ex-1003, 0041

176. P.D. Franzon, W. Lui, C. Gloster-C, T. Schaffer, A. Glaser, and A. Stanaski, "Infrastructure and course progression for complex IC design education," in Proceedings 1999 IEEE International Conference on Microelectronic Systems Education (MSE'99) `Systems Education in the 21st Century' (Cat.No.99-63794). IEEE Comput. Soc, Los Alamitos, CA, USA; 1999; x+104 pp.p.88-9.

177. Bruce Duewer, David Winick, John Wilson, Jeremy Palmer, Paul Franzon "Methodology for Design of Electrostatic MEMS Devices Using the SUMMiT Process", *Proceedings of the 45th International Instrumentation Symposium*, Albequerue, NM, May 1999, p511-520.

178. M. Nakkar, A.W. Glaser, P. Franzon, K. Williams, M. Roberson, G. Rinne, "Three Dimensional MCM Package Assembly and Analysis," in Proc. *IEEE/IMAPS Conference on High Density Packaging and MCMS*, Denver, CO., May 1999, pp. 188-192.

179. B.E. Duewer, J.M. Wilson, D.A. Winick, P. Franzon, "MEMS-based switches for Digital and RF Switching," in Proc. *Advanced Research in VLSI*, Atlanta GA, April 1999, pp.369-377.

180. Mouna Nakkar, Paul Franzon, John Harding, and David Schwartz, "Dynamically Programmable Cache, Evaluation and Virtualization" in *Proc. ACM/SIGDA FPGA* 99, Feb. 1999, Monterey, CA, pp. 246.

181. Paul Franzon, "Design Automation and Design Challenges for Package/Systems," Invited paper, in *Proc. IEEE Asia Design Automation Conference, Hong Kong*, Jan. 1999, pp.372-.

182. T. Schaffer, A. Stanaski, A. Glaser, P. Franzon, "The NCSU Design Kit for IC Fabrication Through MOSIS,", *Proc. 1998 International Cadence User Group Conference*, Sept. 13-17, 1998, pp. 71-80. Won best paper award.

183. Mouna Nakkar, David G.Bentlage, John Harding, David Schwartz, Paul Franzon, and Thomas Conte,"Dynamically Programmable Cache," in *Proc. SPIE Conference on Reconfigurable Computing*, October, 1998, Boston MA, pp. 218-226.

184. S. Lipa, A.W. Glaser, P.D. Franzon, "Flip-chip Power Distribution", in Proc. Electrical Performance of Electronic Packaging, 1998. *IEEE 7th Topical Meeting* on , Page(s): 39 -41

185. M.Azam, R. Evans, and P.D. Franzon, "Power Reduction by low activity datapath design and SRAM energy models", in *Proc. Workshop on Low Power Techniques*, ISCA98, July 1998.

186. H-Y Hsieh, W. Lui, M. Clements, P. Franzon, "Self-calibrating clock distribution with scheduled skews," in *Proc. ISCAS '98*, Volume: 2 ,Page(s): 470 -473 vol.2

Petitioner Samsung Ex-1003, 0042

187. S.P. Chaudhury and P.D. Franzon, "Accurate Lumped-Parameter modeling for dynamic simulation of electrostatic MEMS Actuators", *Proc. International Workshop on Modeling of MEMS Systems*, April 1998.

188. J.T. Schaffer, S.Lipa, A. Glaser, P. Franzon, "Issues in Chip-Package Codesign with MCM-D/Flip-Chip Technology", Proc. *IEEE International Symposium on Chip-Package Codesign* , Feb. 1998, pp 88-92.

189. Winick, B. Duewer, S. Chaudry, J. Wilson, J. Ticker, U. Eksi and P. Franzon, "MEMS-based diffractive optical beam steering system", *Proceedings SPIE*, Vol 3276, pp. 81-87, February, 1998.

190. McClellan, K.J., Jr.; Wailes, T.S.; Franzon, P.D, "An accurate, computationally efficient crosstalk model for routing high-speed MCMs," *in Proc. ASIC Conference and Exhibit*, 1997, Page(s): 110 -114

191. K.J. McClellan, T.S. Wailes, and P.D. Franzon, "Simulation vs. Calculation of Crosstalk", *Proc. IEEE Topical Meeting on Electrical Performance of Electronic Packaging* , Oct. 1997, pp.131-134.

192. Baribrata Biswas, Allen Glasser, Steven Lipa, Michael Steer, Paul Franzon, Dieter Griffis, Phillip Russell, "Experimental Electrical Characterization of On-Chip Interconnects", *IEEE Topical Meeting on Electrical Performance of Electronic Packaging* , Oct. 1997, pp. 57-59.

193. A.W. Glaser, M. Nakkar, P.D. Franzon, T.M. Conte G. Rinne, M. Roberson, V. Rogers, C.K. Williams, "A Low-cost, High Performance Three-Dimensional Memory Module", in *Proc. IEEE Memory Technology, Design and Testing Workshop*, August 1997.

194. Mouna Nakkar, Paul Franzon, A.W. Glaser, V Rogers, K.C. Willimas, and Glenn Rinne, "Thermal/mechanical analysis and design of three dimensional high density MCM package", in *Proc. Next Generation Package Design Workshop*, June 11 1997.

195. M. Azam, P. Franzon, T. Conte, "Low Power Data Processing by Elimination of Redundant Computations", in Proc. 1997 International Symposium on Low Power Electronics and Design, Aug 18--20th, Monterey, California, pp.259-264.

196. Glaser, A.; Nakkar, M.; Franzon, P.; Rinne, G.; Roberson, M.Rogers, V.; Williams, C.K.;"A low cost, high performance three-dimensional memory module", *Proc. Int. Workshop Memory Technology, Design and Testing*, 1997. Page(s): 2 -7.

197. D.A. Winick, B.E. Duewer, S. Palchaudhury and P.D. Franzon, "Performance Elvaluation of Micromechanical Binary Phase-Only Holographic Optical Elements", in

Petitioner Samsung Ex-1003, 0043

Proc. IEEE Electronic Technology and Components Conferenc , May 1997, pp. 419-424.

198. Toby Schaeffer, Alan Glaser, Steve Lipa and Paul Franzon, MCM Implementation of a Data Encryption Standard (DES) Processor ,in *Proc. 1997 IEEE MCM Conference*, Feb. 1997, pp.13-17.

199. Wes Hansford Jennifer Peltier, Paul Franzon, Steve Lipa, and Jonathan Schaeffer, MIDAS Flip-Chip Service , in *Proc. 1997 IEEE MCM Conference*, Feb. 1997,pp.133-135.

200. Paul D. Franzon, Tom Conte, Sanjeev Banerjia, Alan Glaser, Steve Lipa, Toby Schaffer, Andrew Stanaski and Yusuf Tekmen, Computer Design Strategy for MCM-D/Flip-Chip Technology, *in Proceedings 1996 Topical Meeting on Electrical Performance of Electronic Packaging*, Oct. 1996, pp.6-8..

201. Raj Lakhani, Craig Deutschle and Paul Franzon, High Speed Bus Design Using HSPICE Optimization Techniques Based on Worst Case Design Approach, in *Proceedings 1996 Topical Meeting on Electrical Performance of Electronic Packagin*g, Oct. 1996, pp.93-96.

202. P. Franzon, Computer Design Strategy for MCM-D/Flip-Chip Technology, Invited paper, in *Proceedings 1996 ASIC Conference*, Oct. 1996, pp35-39.

203. P. Franzon, System Design Optimization With Multichip Module Technology, Invited Paper, *in Proceedings 1996 Conference of the Brazilian Microelectronics Society*, July 1996.

204. Christoforos Harvatis, Yusuf C. Tekmen, Grif L. Bilbro, Paul D. Franzon, Pin Assignment for High-Performance MCM Systems, in *Proceedings 1996 IEEE ISCAS Conference*. pp. 771-774.

205. Sanjeev Banerjia, Alan Glaser, Christoforos Harvatis, Steve Lipa, Real Pomerleau, Toby Schaffer, Andrew Stanaski, Yusuf Tekmen, Grif Bilbro, and Paul Franzon, Issues in Partitioning Integrated Circuits for MCM-D/Flip-Chip Technology, in *Proceedings 1996 IEEE MultiChip Module Conference*.

206. P. Franzon, Optimal System Design with MultiChip Module Technology, Invited Paper, in *Proceedings of Microeletronics'95.*

207. A.W. Glaser, M.B. Steer and P.D. Franzon, Measurement of on-IC Capacitance Structures, in *Proceedings 1995 IEEE Topical Meeting on Electrical Performance of Electronic Packaging*.

Petitioner Samsung Ex-1003, 0044

208. Winick, M. Teague, and P. Franzon, A Micro-machined Approach to Optical Interconnect, *in Proc. 1995 Electronic Components and Technology Conference. pp. 620-627.* Won best student paper award.

209. Sharad Mehrotra, Paul Franzon, Michael Steer, Performance Driven Global Routing and Wiring Rule Generation for High Speed PCBs and MCMs, in *Proceedings 1995 Design Automation Confere*nce, pp. 36-40.

210. Paul Franzon, Andrew Stanaski, Yusuf Tekmen, Sanjeev Banerjia, "System Design Optimization for MCM", in *Proc. 1995 IEEE MultiChip Module Conference*.

211. S. Mehrotra, P. Franzon, G. Bilbro and M. Steer, CAD tools for Managing Signal Integrity and Congestion Simultaneously, *Proc. 1994 Topical Meeting on Electrical Performance of Electrical Packaging,* pages 30-32.

212. D. Winick, M. Teague, and P. Franzon, Applications of MEMS to Reconfigurable Free Space Optical Interconnect, *Proc. NSF Optical Packaging Workshop*, Breckenridge CO, August 15-17, 1994.

213. S. Mehrotra, P. Franzon and W. Liu, Skew and Delay Minimization of High Speed CMOS Circuits using Stochastic Optimization,*Proc. 1994 Custom Integrated Circuits Conference*, pp. 45-48.

214. S. Mehrotra, P. Franzon and W. Liu, Stochastic OptimizationApproach to Transistor Sizing for CMOS Circuits, *Proc.1994 IEEE Design Automation Conference*, pp. 36-40.

215. M. Sengupta, S. Lipa, P. Franzon, M. Steer, Control of Crosstalk Noise, *Proc. 1994 ECTC Conference.*

216. M.S. Basel, M.B. Steer, and P.D. Franzon, "Hierarchical simulation of high speed digital interconnects using a packaging simulator," *Proceedings 44th Electronic Components and Technology Conference*, May 1994.

217. Slobodan Simovich, Sharad Mehrotra, Paul Franzon, Michael Steer, Zaki Rakib and Garrett Simpson, A Signal Integrity Advisor for Automated Packaging Design, in *Proc. 1993 IEEE Topical Meeting on Electrical Performance of Electronic Packaging*, Monterey CA, October 20--22.

218. Todd A. Cook, P.D. Franzon, and Thomas K. Miller III: "LISAS: A Language for Instruction Set Architecture Specification", *Proc. 1993 ICCD Conference*, pp. 552-557.

219. M. Steer, S. Lipa, and P. Franzon, Experimental characterization of interconnects and discontinuities in thin-film multichip module substrates, *in Proc. 1993 IEEE Topical Meeting on Electrical Performance of Electronic Packaging*, Monterey CA, October 20--22.

Petitioner Samsung Ex-1003, 0045

220. Paul Franzon, Slobodan Simovich, Sharad Mehrotra, Michael Steer, Macromodels for Generating Signal Integrity and Timing Management Advice for Package Design, in *Proc. IEEE 1993 ECTC Conference*. pp. 523-529.

221. Paul Franzon, Slobodan Simovich, Sharad Mehrotra and Michael Steer, Automatic A-Priori Generation of Delay and Noise Macromodels and Wiring Rules for MCMs, *IEEE 1993 MCM Conference.*

222. Slobodan Simovich and Paul Franzon, A simple method for noise tolerance characterization of digital circuits , *Proc. 1993 Great Lakes VLSI Conference*.

223. Todd A. Cook, Ed Harcourt, Thomas K. Miller III, and Paul D. Franzon: Beharvioral modeling of processors from instruction set specifications, to appear in the *Open Verilog International 1993 Conference*.

224. J. Bowen, D. Bahler, and P. Franzon, Design advice systems for concurrent engineering: A constraint-based approach, *NSF Grantees Conference*, Charlotte NC, Jan 93.

225. P.D. Franzon, S. Simovich, M. Steer, M. Basel, S. Mehrotra, and T.D. Mills, "Tools to aid in Wiring Rule Generation for High Speed Interconnects", *Proc. 1992 Design Automation Conference,* pp.466-471.

226. P.D. Franzon, M. Mehrotra, S. Simovich, and M. Steer: Automating Design for Signal Integrity}, *1992 IEEE Topical Meeting on Electrical Performance of Electronic Packaging*,Tuscon AZ, Proc. pp.10--13.

227. M. Steer and P.D. Franzon: Microwave characterization of thin-film multi-chip module substrates and printed wiring boards accounting for frequency-dependent characteristic impedance*, 1992 IEEE Topical Meeting on Electrical Performance of Electronic Packaging*,Tuscon AZ, Proc. pp.125-127.

228. Dholakia, T.M. Lee, D.L. Bitzer, M.A. Vouk, L. Wang, and P.D. Franzon, An efficient table-driven decoder for one-half rate convolutional codes, *Proc. 30th ACM SouthEastCon,* pp.116-123.

229. E.J. Vardaman and M.W. Hartnett and L.H. Ng and P.D. Franzon, "Cost/performance issues in multichip module packaging", *Proc. Japan Int. Conf. on Microelectronics*, 1992.

230. Paul Franzon, Sharad Mehrotra, Slobodan Simovich, Michael Steer, "Automating Design for Signal Integrity", *Topical Meeting on Electrical Performance of Electronic Packaging*,Tucson, Arizona, April 23, 1991.

231. M.B. Steer and P.D. Franzon, "Microwave characterization of thin-film multi-chip module substrates and printed wiring boards accounting for frequency-dependent

Petitioner Samsung Ex-1003, 0046

characteristic impedance," *Topical Meeting on Electrical Performance of Electronic Packaging*, Tucson, Arizona, April 23, 1991.

232. M.B. Steer, S.B. Goldberg, G. Rinne, P.D. Franzon, I. Turlik and J.S. Kasten, "Introducing the through-line deembedding procedure,"*1992 IEEE MTT-S International Microwave Symposium Digest*,June 1992.

233. Paul Franzon, Michael Steer, Ronald Gyurcsik, Tools and echniques for the Design of High Speed Multichip Modules *Proc. Japan IEMT*, July, 1991.

234. D. Van den Bout, T. Nagle, T. Miller and P. Franzon, The NCSU Design Center, in *Proc 1991 Microsystems Educators Conference,* July 1991, San Jose CA.

235. P.D Franzon and M.B. Steer, Interconnect Modeling and Simulation for High Speed MCM, in *Proc. Multichip Module Workshop*, March 28th-29th, 1991, pp. 122--129.

236. P. Franzon and Michael Steer: Tools and Techniques for the Design of High Speed Multichip Modules , in *Proc. Third Annual Electronics Packaging Symposium*,May 13 -14, 1991, Binghamton NY.

237. M.S. Basel, M.B. Steer, P.D. Franzon and D. Winkelstein, High Speed Digital System Simulation using Frequency Dependent Transmission Line Network Modeling, *1991 IEEE MTT-S International Microwave Symposium Digest*, June 1991.

238. S.B. Goldberg, M.B. Steer, and P.D. Franzon, Accurate experimental characterization of three-ports , *1991 IEEE MTT-S International Microwave Symposium Digest*, June 1991.

239. S.B. Goldberg, M.B. Steer, and P.D. Franzon, Experimental electrical characterization of high speed interconnects, *41st Electronic Components and Technology Conference*, May 1991.

240. M.B. Steer and P.D. Franzon: Circuit Simulation with Distributed Elements,Workshop on Circuit and Process Simulation, *Microelectronics Center of North Carolina*, Research Triangle Park, Nov. 6, 1990.

241. P. Franzon, et al: CAD Tools for the Automated Design of High Speed Multichip Modules, *Proceedings of the 1990 International Packaging Symposium*.

242. M. Lorenzetti, A. Dalal, and P. Franzon: McYield: A CAD Tool for Functional Yield Projections for VLSI, *1990 International Workshop on Defect and Fault Tolerance in VLSI Systems.*

243. P. Franzon, D. VanDenBout J. Paulos, T. Miller III, W. Snyder, T. Nagle, and W. Liu: Defect tolerant implementations for feed-forward and recurrent neural networks,

Petitioner Samsung Ex-1003, 0047

Proceedings of 1990 International Conference on Wafer-Scale Integration, January 1990, pages 160-166.

244. P. Franzon: Comparison of Reconfiguration Schemes for Defect Tolerant Mesh Arrays, in *Proceedings of the 1989 Workshop on Defect Tolerance*, Tampa Florida, 22 - 24 October, 1989.

245. P.D. Franzon: Yield Modeling for Fault Tolerant VLSI, in the *Proceedings of the International Workshop on Systolic Arrays*, University of Oxford, England, July 1986.

246. P. Franzon and S.K. Tewksbury: `Chip Frame' scheme for reconfigurable mesh-connected arrays , in the *Proceedings of the 1987 International workshop on Wafer Scale Integration*, Uxbridge England, Sept., 1987.

247. L.A. Hornak, S.K. Tewksbury, M. Hatamian, A. Ligtenberg, B. Sugla and P. Franzon: Through-Wafer Optical Interconnects for Multi-Wafer Wafer-Scale Integrated architectures, in the *Proceedings of SPIE 86*, San Diego California, August 1986.

248. P.D. Franzon: Interconnect Strategies for Fault Tolerant 2D VLSI Arrays , in the *Proceedings of the International Conference on Computer Design*, ICCD-86, Rye Town NY, October 1986, pp. 230-234.

249. K.Eshraghian. R.C.Bryant, A.Dickinson, D.S.Fensom, P.D.Franzon,M.T.Pope, J.E.Rockliff, G.Zyner: The Transform and Filter Brick: A new architecture for signal processing, *VLSI 85*, Tokyo Japan, 25-28 August, 1985.

Invited Research Presentations, Conferences

1. Quantum Computing Panel, DesignCon, 2020.
2. Future of 3DIC. Plenary Session, ECTC, 2020.
3. Quantum Computing Panel, ECTC, 2020.
4. Machine Learning Panel, DAC, 2020.
5. P. Franzon, “Candidate Algorithms,” tutorial, EDAPS, Dec. 2019.
6. P. Franzon, “Stress management in heterogeneous integration,” invited talk, IRSP, Nov. 2019.
7. P. Franzon, “Future of 3DIC”, invited talk, 3DIC 2019, October 2019.
8. P. Franzon, “Machine Learning for EDA,” invited talk, ML CAD Workshop, Sept., 2019.
9. P. Franzon, “Securing Machine Learning,” invited talk, IVSW, July 2019.
10. P. Franzon, “Securing Chips with RFID,” invited talk, IVSW, July 2019.
11. P. Franzon, “Circuit Design with Robots,” panel, RFIC 2019, June 2019.
12. P. Franzon, “Securing Machine Learning,” panel, FAME, May 2019.
13. P. Franzon, “Machine Learning for EDA,” panel, DAC ML CAD Workshop, June, 2019.

Petitioner Samsung Ex-1003, 0048

14. P. Franzon, “Machine Learning for EDA,” invited presentation, DATE ML CAD Workshop, March, 2019.
15. P. Franzon, “Design Rule Checking with CNNs”, invited presentation, SPIE Litho, Feb. 2019.
16. P. Franzon, “Machine Learning and EDA”, panel, DesignCon, Jan. 2019.
17. P. Franzon, “Surrogate Modeling”, tutorial, DesignCon, Jan. 2019.
18. P. Franzon, “Recurrent Neural Networks”, tutorial, Design Con, Jan. 2019.
19. P. Franzon, “Jitter Management in High Speed SerDes”, tutorial in EDAPS 2018, Dec. 2018.
20. P. Franzon, “2.5D and 3D for Machine Learning,” invited presentation in S3S 2018, Nov. 2018.
21. P. Franzon, “3D Memories”, invited presentation at DATE Memory workshop,March 2018.
22. P. Franzon, “Power Efficient Computing Using 3DIC Technologies,” in International Green Semiconductor Symposium,” Oct. 2017.
23. P. Franzon, “Machine Learning in EDA” in EDAPS 2017, Dec. 2017 (invited)
24. P. Franzon, “Cortical Memories,” in DATE Memory Workshop, March 2017 (invited).
25. P. Franzon, “Machine Learning for next generation EDA,” in EDPS 2017, Sept. 2017 (invited).
26. P. Franzon, “Computing in 3D”, in NASA Workshop on Space Electronics, June 2017.
27. P. Franzon, “Computing in 3D,” in EDTM 2017, March 2017.
28. P. Franzon, et.al. “Machine Learning and Electronic Design,” in 2016 EPEPS, October, 2016. (invited).
29. P. Franzon, “Interconnect Solutions Through Codesign,” in Semicon West, July 2016. (invited)
30. P. Franzon, “Interconnect Solutions Through Codesign,” in ASME, June 2016. (invited)
31. P. Franzon, “Cortical Memories,” in DATE Memory Workshop, March 2016 (invited).
32. P. D. Franzon *et al*., "Computing in 3D," *3D Systems Integration Conference (3DIC), 2015 International*, Sendai, 2015, pp. TS6.1.1-TS6.1.2 (invited)
33. P. Franzon *et al*., "Computing in 3D," *Custom Integrated Circuits Conference (CICC), 2015 IEEE*, San Jose, CA, 2015, pp. 1-6. (invited)
34. P. Franzon, et.al. “Computing in 3D”, EDSSC, Singapore, June 2015 (invited)
35. Franzon, P.D.; Rotenberg, E.; Tuck, J.; Davis, W.R.; Huiyang Zhou; Schabel, J.; Zhang, Z.; Park, J.; Dwiel, B.; Forbes, E.; Joonmoo Huh; Priyadarshi, S.; Lipa, S.; Thorolfsson, T., “Computing in 3D”, EDAPS 2014, Bangalore, India, Dec. 2014. (Invited presentation).
36. Franzon, P.D.; Rotenberg, E.; Tuck, J.; Davis, W.R.; Huiyang Zhou; Schabel, J.; Zhang, Z.; Park, J.; Dwiel, B.; Forbes, E.; Joonmoo Huh; Priyadarshi, S.; Lipa, S.; Thorolfsson, T., “Computing in 3D”, ICSJ 2014, Kyoto, Japan, Nov. 2014. (Invited presentation).

Petitioner Samsung Ex-1003, 0049

37. Franzon, P.D.; Rotenberg, E.; Tuck, J.; Davis, W.R.; Huiyang Zhou; Schabel, J.; Zhang, Z.; Park, J.; Dwiel, B.; Forbes, E.; Joonmoo Huh; Priyadarshi, S.; Lipa, S.; Thorolfsson, T., "Computing in 3D", IME Workship 2014, Singapore, Aug. 2014. (Invited presentation).
38. Franzon, P.D.; Rotenberg, E.; Tuck, J.; Davis, W.R.; Huiyang Zhou; Schabel, J.; Zhang, Z.; Park, J.; Dwiel, B.; Forbes, E.; Joonmoo Huh; Priyadarshi, S.; Lipa, S.; Thorolfsson, T., "Computing in 3D", SLIP 2014, San Francisco, CA< June. 2014. (Invited presentation).
39. Franzon, P.D.; Rotenberg, E.; Tuck, J.; Davis, W.R.; Huiyang Zhou; Schabel, J.; Zhang, Z.; Park, J.; Dwiel, B.; Forbes, E.; Joonmoo Huh; Priyadarshi, S.; Lipa, S.; Thorolfsson, T., "Computing in 3D", SPI 2014, Ghent, Belgium, May 2014. (Invited presentation).
40. Franzon, P.D "3D Design, Test and CAD", SPI 2014, DesignCon, Santa Clara, CA, Jan. 2014. (Invited presentation).
41. P. Franzon, P. Gadfort, W. Zhao, "AC powered circuits," S3S, San Francisco, California, Oct. 2014. (Invited presentation).
42. Franzon, P.D.; Rotenberg, E.; Tuck, J.; Davis, W.R.; Huiyang Zhou; Schabel, J.; Zhang, Z.; Park, J.; Dwiel, B.; Forbes, E.; Joonmoo Huh; Priyadarshi, S.; Lipa, S.; Thorolfsson, T., "Applications and design styles for 3DIC," *Electron Devices Meeting (IEDM), 2013 IEEE International* , vol., no., pp.29.4.1,29.4.4, 9-11 Dec. 2013 (invited paper)
43. Franzon, P.; Bar-Cohen, A., "Thermal requirements in future 3D processors," *3D Systems Integration Conference (3DIC), 2013 IEEE International* , vol., no., pp.1,6, 2-4 Oct. 2013 (Invited Paper)
44. Franzon, P.D., "MOOCs, OOCs, flips and hybrids: The new world of higher education," *Microelectronic Systems Education (MSE), 2013 IEEE International Conference on* , vol., no., pp.13,13, 2-3 June 2013 (Invited Paper)
45. Franzon, P.D.; Priyadarshi, S.; Lipa, S.; Davis, W.R.; Thorolfsson, T., "Exploring early design tradeoffs in 3DIC," *Circuits and Systems (ISCAS), 2013 IEEE International Symposium on* , vol., no., pp.545,549, 19-23 May 2013 (invited paper)
46. Keynote, "3D System Design: Present and Future," IEEE 3DIC Test Workshop, Anaheim CA, Dec. 2012
47. Invited Paper, "3D Specific Systems", NY packaging society, GE, Albany, NY, Oct. 2012.
48. Invited Paper, "Design of 3D Specific Systems," D43D, Lausanne, Switzerland, July 2012.
49. Keynote, "Design of 3D Specific Systems: Prospectives and Interface Requirements," IEEE NOC Conference, Copenhagen, Denmark, May 2012.
50. Keynote, "Design of 3D Specific Systems: Prospectives and Interface Requirements," IEEE NOC Conference, Chipex, Tel Aviv, Isreal, May 2012.
51. Keynote, "Design of 3D Specific Systems," DATE 3DIC Workshop, Dresden, Germany, March 2012.
52. Invited Paper, "Coordinating 3D Designs," IEEE 3DIC Conference, Osaka Japan, January 2011.
53. Invited Paper, "3D Specific Design and Test" ATS 2011, New Delhi, India, Nov. 2011.

Petitioner Samsung Ex-1003, 0050

54. Invited Paper, "3D Specific Design," IEEE SAMOS Conference, Samos, Greece, August 2011.
55. Keynote, "3D TSV Processes and Design Challenges," ICMAT, Singapore, June 2011
56. "Computing with Novel Floating Gate Devices," CMOS-ET, Whistler Canada, June 2011
57. Keynote "3DIC, Which Flavor for You?", TIPPS, Chicago IL, June 2011
58. "Design of 3D Specific Systems," NYU-AD 3DIC Workshop, April, 2011
59. "Design of 3D Specific Systems", IMAPS 2010, Raleigh, NC, November, 2010
60. "Creating 3D Specific Systems," DATE 2010, Dresden Germany, March, 2010.
61. "3D Design and Applications," IEEE Litho 2009, June 2009.
62. "Creating 3D Specific Systems," D43D, Grenoble France, June 2009.
63. "3DIC Design and CAD," Austin Chapter Meeting on 3DIC, April 2009.
64. "Application and Design Exploration for 3D Integrated Circuits," VLSI Multi-level Interconnect Conference, September 2008.
65. "Memory rich applicatons for 3D integration," in Proc SPIE 7268, Smart Structures, Devices and Systems IV, Dec. 2008.
66. "Green Electronics, Fact or Myth", panel member, IEEE SOC Conference, September 2008.
67. "Application and Design Exploration for 3D Integrated Circuits," VLSI Multi-level Interconnect Conference, September 2008.
68. "Design and CAD for 3D Integrated Circuits", IEEE/ACM Design Automation Conference, June 2008.
69. "Keeping Chips Hot, Are IC Thermal Problems Hot Air", panel member, IEEE/ACM Design Automation Conference, June 2008.
70. "Application and Design Exploration for 3D Integrated Circuits," VLSI Multi-level Interconnect Conference, September 2007
71. "3DIC", Materials Research Conference, Dec. 2007
72. **"**Molecular Computing," 2nd IEEE International Workshop on advances in sensors and interfaces, June 2007.
73. "TCAM core design in 3D IC for low matchline capacitance and low power," Proc. SPIE Smart Structures, Devices and Systems III, December, 2007.
74. "3-D Design," Fall MRS Conference, December 2007.
75. "3-D Design," RTI 3D Technologies Conference, November, 2007.
76. "Controlled nanowire fabrication by PEDAL process," IEEE NanoNet '06, Sept. 2006,
77. "An integrated self-masking technique for providing low-loss metallized RF MEMS devices in a polysilicon only MEMS process," SPIE Euro Micro Conference, May 2005
78. "Simultaneous switching noise in IBIS models," IEEE EMC, August 2004
79. "Nanoscale Circuits and Computing Systems," ISCAS, May 2004
80. "Integration for Molecular Electronics," FNANO, April 2004
81. "High Frequency, High Density Interconnect Using AC Coupling," MRS Fall Meeting, December 2003
82. AC Coupled Interconnect for High-Density High-Bandwidth Packaging," SPIE Australia Micro Conference, December 2003

Petitioner Samsung Ex-1003, 0051

83. “High Frequency, High Density Interconnect Using AC Coupling,” SSDM Japan, September, 2003
84. “Scalable Molecular Circuit Architectures,” Molecular Electronics Conference, Decemeber 2002
85. “4 Gbps AC Coupled Interconnection,” IEEE CICC, May 2002
86. “Design Automation and Design Challenges for Package/Systems,"Asia DAC, January 1999
87. “Integrated Package Design of a DES Processor,” IMAPS MCM Conference, Oquinqit Maine, August 1997.
88. “Computer Design Strategy for MCM-D/Flip-Chip Technology,” IEEE ASIC, Sept. 1996.
89. “System Design Optimization With Multichip Module Technology,” Brazil Microelectronics Conference, Aug. 1996.
90. “Optimal System Design with MultiChip Module Technology,” Microelectronics 1995, June 1995.

Invited Research Presentations, Universities and Industry

1. “3DIC Design and Floorplanning”, Qualcomm, Dec. 2020.
2. “Chips for AI,” Rambus, June 2020.
3. “Intersecting Machine Learning and EDA,” Apple, Sept. 2019.
4. “Intersecting Machine Learning and EDA,” Cisco, Sept. 2019.
5. “Intersecting Machine Learning and EDA,” BAE, August 2019.
6. “Intersecting Machine Learning and EDA,” Cadence, Jan. 2019.
7. “Machine Learning and EDA,” Global Foundires July 2018.
8. “3D Processors”, Cirrus Logic, June 2018.
9. “H3: A heterogeneous 3DIC Multiporcessor,” Intel, December, 2017
10. “Machine Learning and EDA,” Draper Labs, Sept. 2017.
11. “Cortical Processors,” IBM, Sept. 2017.
12. “Machine Learning in EDA”, Cadence Users Group Meeting, April 2017.
13. “Machine Learning and EDA,” Cadence, June 2017.
14. “Machine Learning and EDA”, Cirrus, May 2017,
15. “Cortical Processors,” Northrop Grumman, Jan 2016.
16. “Computing in 3D”, IMEC, May 2016.
17. “Cortical Processors,” Cirrus, June 2016.
18. “Machine Learning and EDA,”, Synopsys, Nov. 2016.
19. “Mcahine Learning and EDA,” Xilinx, Nov. 2016.
20. “Computing in 3D”, Google, Oct. 2014.
21. “Computing in 3D”, Cirrus Logic, Aug. 2014.
22. “Computing in 3D”, Sandia Labs, May 2014.
23. “3D Specific Design”, Rambus, Sept. 2013
24. “3D Specific Design,” University of Maryland, Dec. 2013
25. “3D Specific Design,” Georgia Tech, May 2013.
26. “3D Specific Design”, IBM, Jan. 2013.
27. “Connectivity in Future Systems,” HP, October, 2012.
28. “3D Specific Design and CAD,” IEEE CPMT Chapter, Portland OR, April 2012.
29. “Connectivity in Future Systems,” IBM, March 2012.
30. “Sensors and System,” IBM, April 2012.

Petitioner Samsung Ex-1003, 0052

31. "3D Specific Systems," Technicon, April 2012.
32. **"**3D Speicifc Design," Mentor Graphics, Nov. 2011.
33. "3D Specific Design", Ga. Tech, June 2011.
34. "3D Specific Desgn and CAD," IBM, January 2011.
35. "Creating 3D Specific Systems," CMOS ET Conference, May 2010.
36. "3DIC CAD," Synopsys, April 2010.
37. "Designing 3D Specific Systems," LSI Logic, March 2010.
38. "3DIC Design and CAD," IMEC, March 2010.
39. "Creating 3D Specific Systems", IBM, March 2010.
40. "Creating 3D Specific Systems," RTI 3D, December, 2009.
41. "3D Memory Systems," SRC Signapore, October 2009.
42. "3DIC Design and Applications," IMEC, June 2009.
43. "3DIC Technology Design and Applications," Tessera, April 2009.
44. "3DIC Technology Design and Applications," Ultratech, January 2009.
45. "3DIC Design and CAD," University of Adelaide, December, 2009.
46. "3DIC Design", Qualcomm, September 2008.
47. "AC Coupled Interconncect", DARPA Exascale Committee, August 2007.
48. "3DIC Design and CAD", TI, March 2008
49. "3DIC Design and CAD," IBM, April 2008
50. "AC Coupled Channels", IBM, April 2008
51. "AC Coupled Interconnect", HP, Sept. 2007
52. "3DIC", CEA-LETI, June, 2008
53. "Interconnect", McGill University, Canada, July 2007.
54. "AC Coupled Interconnect," Intel, AZ, March 2006.
55. "AC Coupled Interconnect", Rambus CA, December 2005
56. "AC Coupled Interconnect," IBM, NY, December 2005
57. "Equalization for on-chip interconnect," IBM, NY, December 2005.
58. "AC Coupled Interconnect," University of Adelaide, October, 2005.
59. "Molecular Electronics," University of Sydney, October, 2005.
60. "AC Coupled Ineterconnect," UFL, April 2005
61. "Molecular Computing," UNCC, March 2005
62. "Nanoscale structures for Molecular Electronics," HP Labs, December 2004
63. "AC Coupled Interconnect," SRC Econfernce, Dec, 2004
64. "AC Coupled Interconnect," Rambus CA, December 2004
65. "AC Coupled Interconnect," Sun, CA, December 2004
66. "AC Coupled Interconnect," IBM RTP, February 2005
67. "AC Coupled Interconenct," Rambus NC, August 2004
68. "Emerging Memory Devices," ITRS, Stresa Italy, April 2004
69. "Optical Networking," ECU, Perth Australia, August 2003
70. "Molecular Electronics," University of Adelaide, August 2003
71. "Molecular Electronics," University of Sydney, August 2003
72. "AC Coupled Interconnect," IBM TX, May 2003
73. "Scalable Molecular Circuit Architectures," USC, April 2003
74. "Molecular Electronic Circuits," KAIST, Korea, July 2002
75. "AC Coupled Interconnect," IBM Research NY, April 2002
76. "AC Coupled Interconnect," Intel AZ, Feb. 2002

Petitioner Samsung Ex-1003, 0053

77. "AC Coupled Interconnect," Intel OR, Feb. Nov 2001
78. "Structures and CAD for Chip-Package Codesign," TI TX, May 2000
79. "High Bandwidth On-Chip Interconnect," TI Dallas TX, May 2000
80. "Heteregenous System Integration," TI, Dallas TX, May 2000
81. "MEMS Application and Fabrication," Ford Microlectronics, CO, Dec. 1998
82. "Chip Package Codesign," Ga Tech, Oct, 1998
83. "Chip-Package Codesign," SRC, NC, April 1997
84. "Chip-Package Codesign," Intel, CA, Oct 1997
85. "Chip-Package Codesign," DEC, MA, Dec 1997
86. "Optimal Computer Design with MCM-D/Flip Chip Technology," Sun, CA, May 1996
87. "Signal Integrity Tools," Sun, CA, May 1996

I have aslso given invited presentations at the following organizations: Stanford University, University of Adelaide, Silicon Graphics, Intel, Ross Technology, Cadence, Mentor Graphics, LSI Technology, Tandem Computer, IBM,Bell Northern Research, MCNC. Dates and exact titles unrecorded.

Appointments or election to study sections and editorial boards.

- Associate Editor, IEEE Transactions on Advanced Pcakaging 1997-
- Associate Editor, ACM Journal on Emerging Computing Technologies, 2004-2011
- Editorial Board, Journal of Microelectronics System Integration.
- Associate Editor, IEEE Transactions on VLSI Systems. 1997 – 2001

B. GRANTS AND CONTRACTS

Total Funding Summary.

80 Research grants and contracts, 1 equipment grant, 1 educational grant, more than 10 cash gifts, over $80 Million in research grants, and $500,000 in educational grants, and over $700,000 in gifts

EXTERNAL GRANT

1. P. Franzon, "Generative Adversarial Network generated models for Signal Integrity, Thermal Modeling, Etc., Center for Advanced Electronics through Machine Learning (CAEML) Core Project 5A3", CAEML IUCRC (UIUC), $59, 876, 8/1/21 – 07/31/22

2. P. Franzon, "Cirrus Logic Mixed Signal IC Design Fellowship," $80,00, 08/15/20 – 8/14/22.

3. P. Franzon, "Field Programmable Gate Arrays Hardware Accelerator for Real Time Security, Center for Advanced Electronics Machine Learning Core Project", $113,594, 1/1/20 – 7/31/22

Petitioner Samsung Ex-1003, 0054

4. P. Franzon, "Three Dimensional Study of the Benefits of Hybrid Bonding," Xper, $163,392, 08/16/19 – 05/15/20 (PI).

Investigate 3DIC design styles.

5. A. Aysu and P. Franzon, "Differential Power Analysis of Deep Neural Networks with Mitigation at the Architecutre Level, SRC, 10/1/19 – 09/30/20, $58,000 (co-PI).

6. P. Franzon, A. Aysu, "FPGA Accelerator Hardware for Real Time Security," CAEML, 1/1/20 – 12/31/21, $100,000. (PI)

Detecting ransomware attacks suing FPGAs.

7. D. Baron, P. Franzon, "High dimensional structural inference for non-linear, deep markov of state base models, CAEML, 1/1/19 – 12/31/19, $54,000. (co-PI).

Investigate deep space ML techniques.

8. P. Franzon, "Agile 3D Memory Interfaces," AFRL, $15,0575, 08/27/15 – 08/26/18, PI

Design interfaces for 3D memories.

9. W. Davis, P. Franzon, "Fast Accurate Power Performance Area Model-Extraction," CAEML, 01/01/19 – 12/31/20, $108,000 (co-PI)

Build models for power/performance tradeoff evaluation.

10. P. Franzon, "Radition Effect in 3D Structures", DTRA via Venderbilt, 10/11/17 – 10/10/22, $705,469 (PI)

Investigate effects of space radiation on 3D elecrtonics.

11. P. Franzon, J. Tuck, "2.5D Extendible Processor,", DARPA/ONR, $3,206,856, 09/30/2017 – 09/30/2021

Build and demosntrated an extendible processor with machine learning chiplets.

12. P. Franzon, "Trusted Fabrication through 3D Integration Demonstration," DARPA/ONR, 09/30/2017 – 04/28/2021, $1,999,504. (PI)

Demonstrate trusted fabrication through a design experiment.

13. W. Davis, P. Franzon, "Applying Machine Learning to Back End IC Design," CAEML, $108,000 1/1/17 – 12/31/20. (co-PI)

Petitioner Samsung Ex-1003, 0055

Develop automated back end flows using machine learning.

14. P. Franzon, "Research Site for I/UCRC Center for Advanced Electronics Through Machine Learning (CAEML)", NSF, 08/01/2016 – 07/31/2021, $300,000, (PI).

The mission of CAEML is to achieve better electronic design through machine learning.

15. P. Franzon, "Behaviroal Modeling for High Speed Links," CAEML I/UCRC, 01/01/2017 – 08/15/2019, $82,000, (PI).

Using machine learning to build better models for high speed links.

16. W. Davis, P. Franzon, "Design Rule Checking with Deep Networks," CAEML I/UCRC, 01/01/2017 – 12/31/2017, $60,000, (co-PI).

Applying machine learning to physical design.

17. B.A. Floyd, P. Franzon, "Intellectual Property Reused through Machine Learning," $100,000, 01/01/2017 – 08/15/2019. (co-PI).

Applying machine learning to custom circuit IP reuse.

18. P. Franzon, "Planning Grant for I/UCRC for Advanced Electronics Through Machine Learning," NSF, 04/15/15 – 03/31/16, $11,499

Planning grant for potential I/UCRC.

19. P. Franzon, "Trusted Fabrication through 3D Integration," DARPA/ONR, 08/01/2015 – 05/15/2017

Study on new techniques to effect trusted ICs.

20. P. Franzon, "Cognitive Computing," Google, $41,000, 3/1/2015 – 2/28/2016.

Investigate speedup potential of cognitively inspired algorithms.

21. P. Franzon, "Hardware acceleration of sparse cognitive algorithms," DARPA/AFRL, $320,372, 12/01/14 – 6/30/16.

Investigate speedup potential of new classes of cognitively inspried algorithms.

22. P. Franzon, "SHF:Small AC Powered Digital Circuits," NSF, 08/01/14 – 07/31/20, $445,713, (PI).

Design a new class of efficient RFID and backscatter BTLE chips.

Petitioner Samsung Ex-1003, 0056

23. P. Franzon, A. Chakrabortty, "Faster than Real Time Simulation of Electromechanical Process of Large Scale Electrical Power Grid", $80,000, ABB, 12/15/14 – 8/15/16. (PI)

Architect an accelerator to simulate power grids.

24. P. Franzon, W. Davis, "Leveraging Commercial Flows for Heterogeneous Integration,", $1,505,643, DARPA, 5/16/2013 – 2/28/2017. (PI)

Produce CAD flows for managing temperature and stress in Heterogeneous 3DIC chip stacks.

25. P.Franzon, E. Rotenberg, W. Davis, H. Zhou, J. Tuck, "3D-Enabled Customized Embedded Computer," $1.1M, DARPA, 9/14/2011 – 9/14/2016. (PI)

Architectect, design and implement a 3D CPU capable of low power computing.

26. P. Franzon W. Davis, E. Rotenberg, "Modular, Testable, Tightly Coupled 3D Implementation of a Heterogeneous Processor", $1,200,000, Intel, 10/1/2011 – 12/10/2017. (PI)

Build novel architectural approaches to implementing 3D specific processors.

27. P. Franzon, Eric Rotenberg, "3D X86 Heterogeneous Core Stack," $55,000, Intel 11/12/2012 – 12/31/2013.

Investigate an X86 based CPU stack.

28. P. Franzon, NSF ASSIST ERC – portion to my projects, NSF, $150,000, 07/01/2011 – 12/31/2013.

System Thrust Leader for ASSIST ERC.

29. P. Franzon, V. Misra, and N.H. DiSpigna, "Computing via Monotlithic Three Dimensional Assemnbly of Novel Floating Gate Transistors," $839,740, NSF, 7/1/2011 – 6/30/2016 (PI)

We have developed the design for a new type of "unified" memory device, a Double Floating Gate FET (DGF FET). It can store two bits in each transistor, one in a volatile state, another in a non-volatile state. The purpose of this grant is to build sample devices and address practical issues related to implementation as a memory device.

30. P. Franzon, "Binary Multimode Interconnect for High Density Chip to Chip Communications," Intel, $300,000 7/1/2011 – 12/31/2014 (PI)

Petitioner Samsung Ex-1003, 0057

A new implementaiton method has been identified for a high-density, low-power, crostalk cancelling chip to chip communications scheme. This paper addresses demonstration of this method.

31. P. Franzon, W.Davis, "Thermal-System Codesign of a Mobile Application," Qualcomm, $150,000, 07/01/2011 – 12/31/2014. (PI)

Investigate pathfinding for 3D systems.

32. P. Franzon, "EAP actuators for a Braille Display," PBI Inc., $30,000, 8/16/2012 – 12/31/2012.

Prototype a Braille cell based on EAPs.

33. **P**.Franzon, "Integrated 3D Packaging for Microscopic Systems," MARCO, $321,000, 11/01/2009 – 1/31/2013. (PI)

Develop integrated packaging concepts and antenna for 1 mm and 1 cm scale systems.

34. P. Franzon, "Speech Recognition Acceleration," Spansion, $123,761, 07/12/2010 – 05/15/2012.

Investigate hardware/software codesign for speech acceleration.

35. P. Franzon, N. DiSpigna, "Nanocrystal Computing," NSF (CCF-0811582), $400,000 07/01/2008 – 06/30/2012. (PI)

Develop new devices, based on nanocrystal films, suited for digital applications. Explore those applications.

36. P. Franzon, "Algorithms and Structures for Self Healing Circuits," $170,000, DARPA, 01/03/2012 – 12/31/2013. (PI)

Investigate CAD techniques for self-calibration of RF circuits

37. P. Franzon, "CAD Support for Tezzaron MPW," DARPA as a subcontract through Tezzaron, $50,000, 7/1/2009 – 6/30/2010.

Support commercial tools as used in Tezzaron MPW run.

38. P. Franzon, M. Steer, T. Kelley, M. Chow, F. Wu, "Self Healing Circuits," DARPA as a subcontract through Raytheon, $1,073,341, 4/1/2009 – 06/30/2013. (PI)

Investigate CAD techniques for self-calibration of RF circuits.

Petitioner Samsung Ex-1003, 0058

39. P. Franzon, M. Ozturk, "Reconfigurable RF Electronics," AFRL, as a subcontract through Raytheon, $60,000, 5/1/2009 – 5/30/2010. (PI)

Design and model a new high-performance Varactor.

40. W.R. Davis, Paul D. Franzon, "Architectural Evaluator for Three Dimensional Integrated Circuits," Semiconductor Research Corporation, $240,000, 7/1/2008 – 6/30/2012. (Co-PI).

Establish CAD tools to help architect 3D Circuits.

41. Paul D. Franzon, W.R. Davis, "CAD Support For the Third MIT-LL 3D-Integrated Circuit Run", $53,375, DARPA, 5/1/2008 – 12/31/2008. NCSU PI. Subcontract through MIT-LL. (PI)

Develop 3D PDK to support third fabrication run.

42. W.R. Davis, P.D. Franzon, "FreePDK: An Open-Source, Variation-Aware Design Kit", CMU as a subcontract to MARCO, $42,338, 9/1/2007 – 8/31/2009. CoPI.

This work will create an open-source, variation-aware 45nm PDK (Process Design Kit) for use in VLSI education and small-businesses. This kit will include the necessary layout design-rules and extraction command-decks to capture layout-dependent systematic variation and perform statistical circuit analysis. The kit will also include a standard-cell library and I/O-pad library with the necessary support files to enable full-chip place & route and verification for System on Chip designs. Test-chips designed with this PDK will be fabricated by an SRC member company, allowing validation of the design-rules so that the rules may be used in future multi-project runs and design contests

43. Paul D. Franzon, "Micromachined Braille Reader", US Department of Education, 11/01/2007 – 10/31/2010, $600,000. PI.

Investigate and build a "full screen" programmable Braille display using ElectroActive Polymers (EAPs).

44. Paul D. Franzon, "Computer Aided Design for Digital Trust", $110,000, DARPA, 1/1/2007 – 06/30/2009. NCSU PI, subcontract to Irvine Sensors Corporation.

Investigate methods to identify theft and modification of chip intellectual property.

45. Paul D. Franzon, "Multimode Interconnect," Semiconductor Research Corporation, 11/01/06 – 12/31/10, $300,000. PI.

With higher core clock speeds, and the trend to multi-core, the demands on chip I/O are increasing rapidly. The key question is how to increase both the density and speed of chip I/O without increasing packaging costs. At high speeds, crosstalk issues typically dictate

Petitioner Samsung Ex-1003, 0059

inter-pair spacings of four times the wire width in PCBs, and rich use of power and ground shields in connectors. In this research, we will investigate coding and circuit techniques that enable a group of signals to travel down a wire bundle, and potentially connectors and cable assemblies, without crosstalk

46. Franzon, Kingon, Wilson, "System Technologies for Space Electronics," AFRL, 09/25/2006 – 6/30/2011, $1,287,807. PI.

Build interconnect technologies for Space Applications. Deploy a demonstrator in a satellite.

47. K.P. Sandeep, Paul D. Franzon, J. Simunovic, "Use of RFID Tags in Determining the Time-Temperature History Within a Product During Processing, Transportation, and Storage," CAPPS, $60,000, 11/01/06 – 12/31/07. and 5/1/06-4/30/10 Co-PI.

Improving food quality, enhancing food safety, and aiding process filing with the FDA are three important areas of interest to the food industry. Accurate determination of the time-temperature history at the critical point in a system (slowest heating point) is necessary to accomplish this. We would like to make use of the RFID technology to capture and transmit internal temperatures of food particulates while they are being pumped through the heating, holding, and cooling sections of a continuous flow food processing system.

48. K.P Sandeep, Paul D. Franzon, Josip Simunovic, "Development and Use of Sensors in Validating Aseptic Processing of Multiphase Foods," US. Dept. of Agriculture, 09/01/06 – 08/31/10. $278,936. Co-PI.

The overall objective of the current study is to develop a sensor that can be used to determine the location and internal temperature of food particles as they flow through the heating, holding, and cooling sections of an aseptic processing system.

49. Franzon, "System Technologies for Low-Power Spaceborne Electronics," AFRL, $1,287,807, 9/25/06 – 9/24/07, NCSU PI.

Demonstrate a complete AC Coupled first level packaging solution in both Bulk CMOS and SOI. Launch a space demonstration vehicle.

50. K.P. Sandeep, Paul Franzon, Josip Simunovic, "Development of a Micro-Electro-Mechanical-System-based (MEMS) temperature sensor to determine internal temperatures within multiphase food products", CAPPS, $54,422, 7/1/06-12/31/11.

In collaboration with Food Science, develop miniaturized sensors for monitoring internal conditions in Food Processing Equipment.

51. Franzon, "MoleFET Design and Fabrication," DARPA, $150,000, 5/11/06 – 11/10/08. (PI at NCSU, subcontract to UVA.)

Petitioner Samsung Ex-1003, 0060

Investigate molecular integration into FET structures for nanoflash and transistor applications.

52. Steer, Franzon, Davis, "Electromagnetic Modeling for 3D ICs," DARPA, $1,870,000, 7/5/04 – 3/31/10, (co-PI, subcontract through PTC).

Tools and Application Exploration for 3D ICs.

53. Franzon, "DNA Directed Circuit Assembly," NSF, $135,000 7/1/03 – 6/30/07. (PI at NCSU)

    In collaboration with Duke University, determine circuit interconnect strategies using DNA scaffolds.

54. Franzon, "High Performance Computer Interconnect," NSF, $350,000, 9/01/2002 – 8/31/2008, (PI).

    We are determining new approaches to interconnect large systems at the system level. These approaches promise high density, low power and low cost.

55. Franzon, "AC Coupled Interconnect for Low-Power Space-Borne Electronics," Mission Research Corporation, $3,116,813, 05/16/03 – 09/30/06. (PI).

    Demonstrate a complete AC Coupled first level packaging solution in both Bulk CMOS and SOI. MCNC is a sub-contractor performing the solder bump and package fabrication investigation.

56. Steer, Franzon, Kingon, "Mixed Signal Interposer," $475,000, DARPA, 6/19/02 – 6/18/06. (co-PI, subcontract from Purdue University).

57. Franzon, "Hybrid Defense Mechanisms for Network Security," MDA, $30,000, 8/22/05 – 2/22/06 (PI at NCSU, subcontract from Irvine Sensors).

In collaboration with Irvine Sensors, implement new hardware algorithms for Intrusion Detection for high performance networks.

58. Franzon, "System Packaging for AC Coupled Interconnect," DARPA, $501,550, 7/1/04 – 9/30/09. (PI at NCSU, Subcontract from Irvine Sensors Corporation).

In collaboration with Irvine Sensors, design and build a 3D Module incorporating multiple FPGAs and memories, capable of high performance DSP.

59. Franzon, "Molecular Computing Technology," DARPA,$62,293, 8/1/04 – 7/31/05,(PI at NCSU, subctrontract from Rice University).

Petitioner Samsung Ex-1003, 0061

In collaboration with Rice University, build and demonstrate new technologies for Molecular Computing.

60. Franzon, "AC Coupled Interconnect Demonstration," SRC, 07/01/03 – 06/30/06, $300,000. (PI)

    Determine design rules for AC Coupled Interconnect Systems.

61. Franzon and Conte, "TRIPS SystemC/En-morph mode specification and Implementation", DARPA, 05/16/03-03/15/05, $275,000 (PI).

    Investigate the implementation of programmable network processors using reconfigurable computing concepts. Aim at achieving configurable line rate (10 Gbps) solutions for network security, routing, and difserv.

62. Steer and Franzon, "Advanced Modeling of Mixed-Signal Systems" Agency: DARPA 08/01/01 to 07/31/04, $1,665,235. (co-PI). (See Steer's PA2 for description).

63. Steer, Kingon, and Franzon, Mixed-Signal Interposer Design and Fabrication (as subcontract to Purdue University), $1,070,000, 1 May 2002–30 April 2005., (co-PI). (See Steer's PA2 for description).

64. Franzon, "Molecular Interconnect Studies" Mission Research Corp. to DARPA 07/11/2001 to 07/10/05, $533,123 (PI).

    Work within a Naval Research Labs-lead team to develop solutions for build nanoscale molecular memories using viruses as an interconnect scaffold. Perform circuit studies, and characterization experiments.

65. Franzon, "Molecular Circuits II" DARPA, 03/21/01 - 03/31/05 $500,000 (PI).

    Work within the Rice-lead team to determine circuit architectures suited for molecular memories.

66. Franzon and Cangelleris, "Inductance Control for On-Chip Signal Integrity" NSF 08/01/00 to 07/31/05, $420,000 (PI).

    Determine practical techniques to reduce the impact of on-chip inductance on circuit performance and design time.

67. Franzon, Liu and Hughes, "SOI Deep Space Radio" NASA (sub thru A&T), 03/12/01 to 05/30/05, $771,080 (PI).

    Investigate novel circuit structures for use in an ultra-low power deep space VHF radio communications system.

Petitioner Samsung Ex-1003, 0062

68. Franzon and Liu, "AC Coupled Interconnect", SRC, 09/01/99 to 08/16/03 $321,166 (PI).

    Determine design rules and approaches for using capacitively and inductively coupled interconnect structures for between-chip communications.

69. Franzon, "Network Processor Design for Just in Time Optical Networking Protocols," ARDA, 10/01/01 to 03/28/03, $189,034 (PI).

    Implement a network processor for a future optical backbone protocols using Just-In-Time (JIT) Optical Burst Switching concepts. Work with MCNC to get a small JIT network up and running. Develop new hardware algorithms for critical bottlenecks, particularly the Forwarding Engine.

70. P.D. Franzon, A. Kingon, E. Grant, "Planar Processed Robots", DARPA, 6/28/98 - 6/2/02, $1,274,527.

71. R. Hodges, et.al. and P. Franzon, "Applications of MEMS to textiles" National Textiles Foundation, 4/15/00 - 4/14/01, ECE share: $35,000.

72. P. Franzon, and W. Lui, "AC Coupled Interconnect,"10/1/99 - 9/30/02, Semiconductor Research Corporation, $321,166.

73. P. Franzon, "VLSI Approaches to Chip-Package Codesign," 1/1/00 - 6/30/00, Semiconductor Research Corporation Exploratory Grant, $25,000.

74. P. Franzon, "Molecular Circuits," 2/1/00 - 1/31/01, DARPA, $53,015.

75. P.D. Franzon, T. Conte, "SHOCC Demonstrator Study," 7/1/99 - 5/26/00, Northrop Grumman, $128,857.

76. P.D. Franzon, MEMS-based Diffractive Beam Steerer, STTR Phase 2 under sub-contract to NIPT from the USAF, Jan 1, 1998 -- June 30, 2000, ($170,000).

77. P. Franzon, W. Liu, M. Steer, Low-Power, High-Performance MEMS-based Switch Fabric, Oct. 1, 1996--Sept. 30, 1999, DARPA, ($1,047,658).

78. P. Franzon, T. Conte, W. Liu, Three Dimensional High Density Electronic Module Design and Manufacturing, Jan. 1, 1997--Dec 31., 1998, From MCMC under sub-contract from DARPA, ($257,285).

79. P. Franzon, MEMS-based Diffractive Beam Steerer, STTR under sub-contract to NIPT from the USAF, Sept. 14, 1996-- Sept. 13, 1997, ($35,000).

Petitioner Samsung Ex-1003, 0063

80. M. Steer, P. Russel, P. Franzon, “Experimental Determination of On-Chip nterconnect Capacitances", January 1, 1995 to October 31, 1995, warded by Sematech ($127,341).

81. G. Bilbro, P. Franzon, “Performance Driven System Design", awarded by Intel Corporation ($35,000 per year).

82. P. Franzon, G. Bilbro, M. Steer, “Methodology, Tools and Demonstration of MCM System Optimzition", November 1, 1993 to April 30, 1997,awarded by ARPA ($675,440).

83. P. Franzon, NSF Young Investigators Award, October 1993--March, 2000, ($285,000).

84. J. Bahler, J. Bowen, P. Franzon, “A Generic Architecture for Intelligent Networked Colocation in Concurrent Engineering" (with specific application to early system decision making vis electonic packaging), October 1, 1992 to March 31, 1996, awarded by NSF ($599,986).

85. P. Franzon, “P2E Transformation Engine for the Generation of Wiring Rules for Signal Integrity and Timing Management", May 1, 1992 to April 30, 1993, Cadence Design Systems ($35,009).

86. W. Alexander, P. Franzon, W. Liu, M. Steer, “Equipment for building and testing very high speed digital systems", awarded by NSF ($250,000).

87. P. Franzon, M. Steer, “Interconnect models for computer aided design of high speed, multichip modules and integrated circuits", 15 February, 1991 to 30 June, 1993, awarded by NSF ($273,466).

88. P. Franzon, A. Kelley, “New Approaches to Low Energy Computing", 28 February to 31 December, 1991, awarded by IBM ($29,994).

89. J. Bowen, J. Bahler, P. Franzon, “Design for Testability, Part II", 1 January, 1991 to 31 December, 1991, awarded by Integrated Manufacturing Systems Engineering Institute ($19,000).

90. H.T. Nagle, D. Van Den Bout, T. Miller, P. Franzon, “Design Center for Teaching Digital Design", 1 September, 1990 -- 31 August, 1993, awarded by NSF ($500,000).

91. P. Franzon, “Evaluation of CAD tools for teaching", MCNC, 1 January, 1991 -- 15 May, 1991, $4,500.

92. P. Franzon, “CAD Tools for MCMs", MCNC. ($24,008), 16 May 1989 -- 15 September 1990.

93. Principal Investigator, “CAD tools for yield modeling", MCNC. (\$8,694), 16 August 1989 -- 15 May 1990.

Petitioner Samsung Ex-1003, 0064

GIFTS IN CASH

1. P. Franzon, Qualcom, Faculty Award, $70,000, 2019, 2021
2. P. Franzon, Mentor Graphics, Verification Tool flow, $240,000, 2010 - 2020
3. P. Franzon, Google, $42,000
4. P. Franzon, IBM, $95,000
5. P. Franzon, W. Davis, Cadence, Tool Flows, $25,000
6. P. Franzon, W. Liu, Analog Alliance, $142,263
7. P. Franzon, M. Steer, Cadence, Interconnect, $350,000
8. P. Franzon, W. Liu, Unrestricted Gift, Mitsubishi, VLSI Research, $93,899
9. P. Franzon, Unrestricted Gift, Motorola, $21,100
10. P. Franzon, SRC, Chip-package codesign, $25,000
11. P. Franzon, IEEE, $20,000

EDUCATIONAL GRANTS

1. H.T. Nagle, D. Van Den Bout, T. Miller, P. Franzon, "Design Center for Teaching Digital Design", 1 September, 1990 -- 31 August, 1993, awarded by NSF ($500,000).

UNSPONSORED REASEARCH

PENDING PROPOSALS

EXTERNAL EQUIPMENT

1. P. Franzon, T. Conte, W. Liu, C. Gloster, "Experimental High Performance Computing and Communications Systems", NSF CISE Infrastructure Award, July 1, 1997 -- June 30, 2003, ($1,338,283 including $503,046 in NCSU matching).

Provide the research infrastructure for a variety of activities in the Computer Engineering group at NCSU-ECE.

INTERNAL GRANTS

1. Chancellors Innovation Fund Award, $50,000, 2013-14.
2. NCSU ECE CAD Lab, Provost Office, $75,000, 1995.

C. ORGANIZATION PARTICIPATION

- Center for Advanced Electronics through Machine Learning, Site Director
- Electronics Research Laboratory, Co-Director
- Microelectronic Systems Laboratory, Director

D. HONORS AND AWARDS RELATED TO SCHOLARLY EFFORTS

Petitioner Samsung Ex-1003, 0065

- NCSU Innovator of the Year Award, 2015
- NRL Alan Berman Research Publication Award, 2008
- Babbage Award, Synopsys, 2008
- Fellow of the IEEE, 2006
- Alcoa Research Award, 2005
- NSW Australia Expatriate Scientist Award, 2003
- First round prize winner, SRC copper challenge, 2000.
- National Science Foundation Young Investigator's Award, 1993.
- 13 prizes while a student at the University of Adelaide

Petitioner Samsung Ex-1003, 0066

IV. EXTENSION AND ENGATEMENT WITH CONSTITUENCIES OUTSIDE THE UNIVERSITY

A. ACCOMPLISHMENTS

- **NCSU Education and Research Design Kit. This is a CAD tool (software) kit that enables researchers to design silicon chips using the MOSIS brokered foundries, and the popular Cadence And Mentor Design Tools. Originally introduced in 1994, we maintain this kit actively. Right now, there are over 2,000 active users, dominated by Universities, but also used by Industry.. I started and lead this activity. It has won several prizes from Cadence and the Cadence Users Group. With Rhett Davis, it recently expanded in a 45 nm and 14 nm PDKs. Several tool tutorial were also recently added. More information can be found at www.ece.ncsu.edu/cadence**

- NCSU Spice2Ibis Converter. This is a freeware software utility that allows the automatic macromodeling of chip input/output in the EIA IBIS standard. We have supported this converter since 1997. Version 3 was written last year. There are over 3,000 active users, mainly Industry. Together Michael Steer and I started and maintain this activity. More information can be found at www.ece.ncsu.edu/s2ibis

B. PROGRAM IMPACTS

Petitioner Samsung Ex-1003, 0067

V. TECHNOLOGICAL AND MANAGERIAL INNOVATION

A. KNOWLEDGE/TECHNOLOGY TRANSFER

PATENTS FILED

U.S. Provisional Patent Application
Title: DESIGN OF CONTACTLESS CONNECTOR FOR SIMULTANEOUS POWER AND DATA TRANSFER
Serial No.: 62/700,975; Filing Date: July 20, 2018
Inventor(s): Nazia Zannat and Paul D. Franzon
NCSU Ref.: 18107 T|H Ref.: 221404-8570

Granted:

US-6934252-B2	Methods and systems for fast binary network address lookups using parent node inform
US-6985483-B2	Methods and systems for fast packet forwarding
US-2011169589-A1	reconfigurable filter apparatus
US-2003100200-A1	Buried solder bumps for AC-coupled microelectronic interconnects
US-2013176763-A1	Stacked memory with redundancy
US-2007128744-A1	Self-assembly of molecules and nanotubes and/or nanowires in nanocell computing devi
US-2007297216-A1	Self-assembly of molecular devices
US-2013279280-A1	Stacked memory device with redundant resources to correct defects
US-2012175696-A1	Multilayer floating gate field-effect transistor (fet) devices and related methods
US-2014376364-A1	Temporal redundancy
US-2015340872-A1	Electrical connector parts for combining power delivery and signaling in inductively coup
US-2013168674-A1	Methods and Systems for Repairing Interior Device Layers in Three-Dimensional Integrat
US-8208578-B2	Systems, methods, and computer readable media for fractional pre-emphasis of multi-m
WO-2012058074-A2	Thermal isolation in 3d chip stacks using gap structures and contactless communications
US-2013314291-A1	Millimeter scale three-dimensional antenna structures and methods for fabricating same
US-2013300498-A1	Methods, systems, and computer program products for low power multimode interconn
US-2013069709-A1	Ac powered logic circuits and systems including same
US-2014003549-A1	Methods, systems, and computer program products for asymmetric multimode intercon
US-9613544-B2	Electroactive, actuated dot structures and associated methods
US-9568546-B2	Delay fault testing for chip I/O
WO-2004068497-A2	Self-assembly of molecules and nanotubes and/or nanowires in nanocell computing devi

Applications not (yet) granted:

TECHNOLOGY TRANSFER

- <**Numerous submission – no longer tracked**>

Petitioner Samsung Ex-1003, 0068

- T. Conte and P. Franzon, "Networking Benchmark Kit", released 2004.
- P. Franzon. DLX RTL Design. This copyrighted microprocessor design has been released to several companies to help them evalaute their Computer Aided Design tools.
- P. Franzon. DES RTL Design. This copyright encryption design has been released to several companies to help them evalaute their Computer Aided Design tools.
- S. Lipa, A. Glaser, M. Steer, P. Franzon, Spice2Ibis software, available on the ERL Web Site.
- Y. Tekmen, S. Mehotra, P. Franzon, Signal Integrity Advisor software, available on the ERL Web Site.

B. DESCRIBE PROGRAM IMPACTS

Petitioner Samsung Ex-1003, 0069

VI. SERVICE TO UNIVERSITY AND PROFESSIONAL SOCIETIES

DEPARTMENT SERVICE

- **Director of Graduate Programs, 2016-**
- **Chair, Graduate Studies Committee, 2016-**
- **Chair, Graduate Admissions Committee, 2016-**
- Graduate Studies Committee, 1992-3, 2003-12
- ECE Mission Committee, 2010-
- ECE Awards Committee, 2010-
- Circuits Search Committee, 2001, 2002, 2003, 2004, 2005
- CPE Search Committee, 1995, 1996
- ECE Department Head Search Committee, 1995, 2002
- Obtained funding for and recruited, and directed NCSU IT infrastructure personnel, 1996-2001.

UNIVERSITY SERVICE

- **DELTA Advisory Committee, 2013-**
- **Intellectual Property Committee, 2009-12, 2015-**
- **COE Faculty Advancement Round Table, 2016-**
- STRAG committee member, 2003-2005
- COE Computing Committeee, 1994-1995

INTERNATIONAL PROFESSIONAL ACTIVITIES

- Member, Board of Governors, IEEE CPMT, 2007-2009, 2010-2013.
- **Chair, IEEE 3DIC Conference, 2009, 2013, 2016, 2019**
- General Chair, IEEE CPCW, 2011.
- Technical Program CoChair, NanoArch, 2009
- **Chair, IEEE EPEP, 2007, 2017**
- Co-chair, IEEE EPEP, 2006.
- **Associate Editor, IEEE Transactions on Advanced Packaging.**
- Associate Editor, ACM Journal on Emerging Computing Technologies**.**
- Program Committee Member, ChinaCOM, 2007-2008
- Program Committee Member, NanoArch, 2008-
- Program Committee Member, DesignCon, 2007-
- Program Committee Member, NanoNet, 2006-
- Program Committee Member, SPIE Microelectronics, MEMS, and Nanotechnology 2008
- **Program Committer Member, IEEE EPEP Workshop, ongoing**
- Program Committee Member, IEEE FDDP Workshop, ongoing
- Member, DARPA ISAT advisory committee on 3D ICs, 2003
- **Reviewer, Hong Kong Engineering Research Council.**
- **Reviewer, Australia Research Council**
- **Reviewer, Innovate Canada**
- **Reviewer, Singapore Science Foundation**

Petitioner Samsung Ex-1003, 0070

- **Reviewer, National Science Foundation**
- **Reviewer, Army Research Office**
- **Reviewer, US Department of Agriculture**
- **Reviewer for the journals: IEEE Transactions on Computer Aided Design, IEEE Transactions on Computers, IEEE Trans CPMT, IEEE Trans VLSI Systems, IEEE Journal of Solid State Circuits, IEEE Trans. Semiconductor Manfuacturing, Nature Materials, IEEE MTT, amongst others**
- Co-organizer, NSF Workshop on Molecular Computing, 2002
- Member, DARPA ISAT advisory committee on Molecular Computing, 2002.
- Co-Technical Chair, IEEE/IMAPS System Packaging Workshop, RTP, NC May 14-16, 2002.
- Chair, Design, Characterization, and Packaging for MEMS and Microelectronics II, SPIE Conference, Adelaide, Australia, Dec. 2001.
- General Chair, 1997 IEEE MultiChip Module Conference.
- Technical Program Chair, 1996 IEEE MultiChip Module Conference.
- Program Committee, 1996/1997 IEEE Innovative Systems In Silicon Conference.
- General Chair, 1997 IEEE MultiChip Module Conference.
- Technical Program Chair, 1996 IEEE MultiChip Module Conference.
- Co-Chair, 1993 SouthEastern Universities Undergraduate Design Conference.
- Co-Chair, 1997 IEEE Workshop on Clock Design.
- Program Committee, 1997, 1998 IEEE Int. Conference on Computer Design.
- Program Committee, 1997, 1998 ISIS.
- Tutorial Chair, 1994, 1995 IEEE MultiChip Module Conference.
- Education Committee Chair, IEEE CPMT Society, 1992-1995.
- Program Committee and Tutorial Chair, 1993-2000 IEEE Topical Meeting on
- Electrical Performance of Electronic Packaging.
- Program Committee, MICRO/MEMS'99.
- Program Committee, MICRO/MEMS'00.
- Program Committee, CPD-99, CPD-00.
- Program Committee, 1998 IPID.
- Program Committee, 1998 IMAPS MCM Conference.
- Reviewer, Design Automation Conference..
- Reviewer, Swiss National Science Foundation.

As Director of Graduate Programs (May 2016-), I have achieved the following:

- In consultation with the faculty reduced the coursework requirements for PhD students
- In consultation with the faculty simplified the coursework requirements for MS students
- Refocused the graduate office with an emphasis on student service
- Took direct responsibility for MS recruiting and headed the GAC committee, which focused on PhD recruiting
- Made the recruiting season earlier with a focus on getting offers to top students out earlier
- Made recruiting “friendlier” with a letter to all admitted students

Petitioner Samsung Ex-1003, 0071

- Started a “big data” program to guide future recruiting efforts
- Started regular review of PhD students and progress towards degrees
- Provided closer management of TAs
- Encouraged faculty to develop new courses in areas of high demand, leading to the introduction of an Advanced Verification course, a OS course, and a better focus on machine learning
- Started the process to allow semester CPT for International MS students
- Established Graduate Certificates in 5G, ASIC, CPE and EE
- Introduced an effective PhD Visit Day

Petitioner Samsung Ex-1003, 0072