

10 YEARS ANNIVERSARY OF SOLID-STATE CIRCUITS SOCIETY CHAPTER POLAND

10 lat oddziału Solid-State Circuits Society w Polsce

ORIGINS OF THE IEEE SOLID-STATE CIRCUITS SOCIETY (SSCS) CHAPTER POLAND

The IEEE SSCS is the society "where ICs are in IEEE". Even though the microelectronics research was conducted at several universities in Poland, as well as the microelectronic industry was present in Poland since many years, when we formally started on 8th February 2013, and kicked-off the SSCS Chapter Poland in June 22nd, 2013, we had only 12 founding members. The meeting was held and was warmly welcomed during MIXDES conference (Mixed Design of Electronic Circuits and Systems), Gdynia [1]. Among the session speakers there were: Rakesh Kumar (President of IEEE SSCS), who encouraged us to establish a chapter in Poland, Prof. Wiesław Kuźmich (Warsaw University of Technology), who presented the collapse of Polish microelectronic industry in the early 90s' and the REASON project that was founded by EU and helped to revive the design activities across the eastern Europe in the years of 2002–2005.

Since its beginning, the chapter is highly focused on educational initiatives focused on:

- propagating the knowledge of microelectronics among the students,

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- strengthening the relations between engineers and researchers from universities and industry working on solid state circuits,
- creating and sustaining enthusiasm for custom solid-state circuit design, especially among young engineers,

ABSTRACT

This paper presents the origins and evolution of IEEE Solid-State Circuits Society Chapter Poland established in 2013 by a group of microelectronic professionals and academics. During the years of its activity, the chapter officers managed to organize many interesting, microelectronics-focused seminars, courses, and lectures delivered by renowned people, often authoring the books used during the education of the new generation of circuit designers. A big success was an organization of the European Solid-State Circuits Conference / European Solid-State Device Research (ESSCIRC/ESSDERC 2019) conference in Kraków, an event that was warmly received by the majority of participants and steering committee of this most prominent microelectronics-focused conference organized yearly since more than 50 years. The establishment of the chapter helped grow the microelectronics industry and academia activities in Poland.

KEYWORDS: IC, Integrated Circuits, Microelectronics, ASIC, solid-state circuits

STRESZCZENIE

Artykuł prezentuje początki i rozwój polskiego oddziału (Chapter) IEEE Solid-State Circuits Society założonego w 2013 roku przez grupę profesjonalistów i wykładowców akademickich. Przez lata swojej aktywności, oddział zdołał zorganizować wiele interesujących wykładów, seminariów i kursów zorientowanych na mikroelektronikę. Wydarzenia te były często prowadzone przez znane osobistości, często autorów pozycji literaturowych wykorzystywanych do edukacji nowej generacji projektantów układów scalonych. Wielkim sukcesem była organizacja w Krakowie konferencji European Solid-State Circuits Conference/European Solid-State Device Research (ESSCIRC/ESSDERC 2019). Wydarzenie to odbiło się bardzo pozytywnym echem w środowisku, wśród zarówno jej uczestników jak i komitetów organizacyjnych tej najważniejszej europejskiej konferencji ukierunkowanej na mikroelektronikę, organizowanej corocznie od ponad 50 lat. Założenie oddziału pomogło rozwinąć zarówno przemysł jak i działalność akademicką w dziedzinie mikroelektroniki w Polsce.

SŁOWA KLUCZOWE: układy scalone, mikroelektronika, ASIC

Fig. 1. Kick-off meeting of the IEEE SSCS Chapter Poland during Mixdes conference in Gdynia, 2013

Rys. 1. Spotkanie założycielskie chapteru IEEE SSCS podczas konferencji Mixdes w Gdyni, 2013



- increasing the quality and innovation factor of our IC designs in Poland,
- investing in young people and the quality.

During next years the chapter managed to organize 54 events (average of 6 per year, see Table I) and has grown with the number of members up to 26 in 2018 and 42 in 2020. Nevertheless, we believe that significant participation (usually around 50 people up to 130) in our events has resulted in significant impact among the students, industry professionals as well as researchers and helped to grow the microelectronics in Poland.

Establishment of the SSCS Chapter Poland coincided with starting a new undergraduate and graduate studies named Microelectronics in Industry and Medicine (MTM) (<http://www.mtm.agh.edu.pl/>) at the AGH university of Science and Technology in Kraków, done by the chapter's founding members. Every year our faculty brings attention of hundreds of young people from whole Poland, and only sixty of them are enrolled and have opportunity to learn about different aspects of microelectronics, from analog and digital design, through testing/measurement aspects, systems and circuits design, RF de-

sign up to software/hardware/PCB design. Roughly half of them continues master's studies and the remaining ones start their careers in the industry earlier.

To feel the taste of analog integrated circuits design, our students attend to lectures like: Semiconductor Devices, Analog and Digital Electronics, VLSI Design using CAD/CAE tools (schematic/layout), Digital Verification, or RF Microelectronics (See Fig. 4 for VLSI-oriented education path at the MTM). These subjects are covered by lectures, laboratories and also by panel classes, mainly inspired by the world-class literature of the following authors:

Willy Sansen, Behzad Razavi, Adel Sedra and Kenneth Smith or Paul Allen. We also use very good educational articles from Solid-State Circuits Magazine, like the series of *Circuit Intuitions* by Ali Sheikholeslami, or *A circuit for all seasons* by B. Razavi.

Students are also motivated by involving them in the research projects in various technology nodes from 180 nm down to 28 nm led by the researchers being also the chapter members. The exemplary projects the students participated in are shown in the Fig. 3. The microelectronics-oriented stu-

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MTM Mikroelektronika w Technice i Medycynie

255 followers • 6 following

Fig. 2. Facebook page of the Microelectronics faculty at the AGH University of Science and Technology, Kraków, Poland themed by the photo taken during one of the IEEE SSCS chapter meetings with prof. Bogdan Staszewski, 2019

Rys. 2. Strona kierunku Mikroelektronika w Technice i Medycynie na platformie Facebook w roku 2022. Temem jest fotografia z jednego ze spotkań Chapter'u IEEE SSCS z prof. Bogdanem Staszewskim, 2019

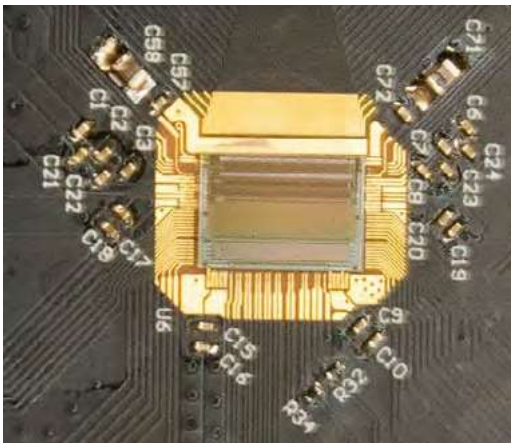
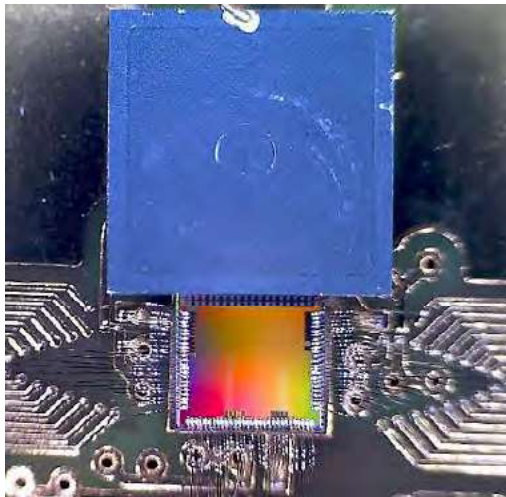


Fig. 3. Left: Example of IC co-designed by SSCS members and young students – 2.5 x 4 mm² – TSMC 40 nm. Right: STS-XYTER [3], one of the ASIC tested by students during their courses

Rys. 3. Po lewej: Przykład układu scalonego zaprojektowanego przez członków IEEE SSCS Chapter Poland oraz studentów mikroelektroniki – 2.5 x 4 mm², TSMC 40 nm. Po prawej: STS-XYTER [3], przykład układu scalonego testowanego przez studentów mikroelektroniki w ramach wybranych przedmiotów

dent projects are frequently presented during the conferences and receive awards (like recently, in 2022, during MIXDES conference in Wrocław three students were awarded for 8-channel IC chopper based system for biomedical experiments developed in CMOS 40 nm).

Chapter members are also involved in pre-college activities organized often jointly with the microelectronic industry (e.g. Silicon Creations Poland, Cadence Design Systems, Intel Corporation) that contributes to the SSCS members as well. Most of them are focused on promoting microelectronics as an interesting and profitable direction. One of these are presentations given at the top 15 best high schools and technical high schools throughout the region showing the Microelectronics studies as pros. We also organize educational trips, eye-opening presentations, and apprenticeships organized for Technical High-Schools also by industrial members of the chapter. To further stimulate young people's interest in the microelectronics field chapter members actively participate in the organization of an Electronic

First-cycle studies (bachelors)	
Semester 1	Circuit theory
Semester 2	Electronic devices and VLSI technology Basics of circuits and electronics
Semester 3	Analog electronic circuits 1 Digital electronic circuits 1
Semester 4	Analog electronic circuits 2 PCB design Digital electronic circuits 2
Semester 5	Basics of analog integrated circuits design Introduction to nonlinear analog circuits Programmable Logic Devices
Semester 6	Basics of VLSI digital design
Semester 7	Testing and measurements of integrated circuits
Second-cycle studies (masters)	
Semester 1	Design of advanced analog VLSI blocks for sensor systems Analog electronic circuits 3 (optional)
Semester 2	Verification of digital integrated circuits Design of advanced digital and mixed-mode VLSI blocks (optional) Design of RF integrated circuits in VLSI technologies (optional)

Fig. 4. Educational tracks on Microelectronics in Industry and Medicine, AGH
Rys. 4. Ścieżki edukacji na kierunku Mikroelektronika w Technice i Medycynie (MTM), AGH

Contest gathering a few thousand young people from the whole of Poland (www.oowee.agh.edu.pl) each year. Importantly these contests do not verify the theory only (students are obliged to answer 50 test-like questions) but those who are qualified for the next stage compete in building and testing practical electronic circuits from off-the-shelf components (like LDO, opamps, filters, digital subblocks, etc.). Also, thanks to the contests it is possible to meet students' tutors with both the microelectronic industry and academics so the college program could be easily adapted to fast-changing technology.

IMPORTANT EVENTS

As stated before, throughout almost 10 years of activity, SSCS Chapter Poland managed to organize 54 technical meetings. Majority of them were memorable because of the renowned figures of microelectronics world. SSCS Chapter Poland managed to host the lectures conducted by the authors of well-cited scientific papers, academic books and respected industry professionals (*Table 1*). Let's bring back some of them.

First events

Already the first year of chapter's activity was very active (*Table 1*) [5]. Benefiting from "Distinguished Lecturers" program of SSCS Society, four of them visited Kraków: Jan Kranickx, Stefan Rusu (Intel), Franz Dielacher (Infineon) and Lucien Breems (NXP). During this event, prof. Pawel Gryboś (AGH) organized a hands-on tutorial on Noise Minimization Techniques. Cooperation with Fermi National Laboratory on design of 3D integrated radiation imaging circuits resulted also in an invited lecture given by Grzegorz Deptuch (FermiLab).

Willy Sansen

Willy Sansen (KU Leuven) is a key figure of analog circuit design [6] and a past president of IEEE SSCS society. Students of MTM are being taught using his excellent book, "Analog Design Essentials". SSCS Chapter Poland had a pleasure and privilege to host four courses

Tabl. 1. List of technical meetings organized by the SSCS chapter Poland

No.	Year	Event details
0	2013	Kick-off Meeting of IEEE SSCS Chapter Poland during Mixes Conference in Gdynia, Poland.
1		Jan Craninckx (IMEC) (IEEE Distinguished Lecturer), "Low-power Successive Approximation ADCs for Wireless Applications", 2013-09-30, 50 people.
2		Stefan Rusu (Intel), "Microprocessor Design in the Nanoscale Era", 2013-09-30, 50 people.
3		Franz Dielacher (Infineon), 2013-09-30, 50 people.
4		Rakesh Kumar (TCX Technology Connexions), "Challenges and innovation opportunities in semiconductors", 2013-12-17, 30 people.
5	Grzegorz Deptuch (FERMI National Laboratory), "3D integration for circuits in radiation detection", 2013-12-17, 30 people.	
6	2014	Fabrice Bedoucha (PSA Peugeot Citroen), "Embedded software in automotive", 2014-10-22, attendance: 153 people
7		Francesco Svelto, Prof. (IEEE Distinguished Lecturer), Introduction to Voltage Controlled Oscillators", "Transceivers for wireless communications at millimeter-waves", 2014-12-09, 31 people.
8		Willy Sansen (KU Leuven), "Design of low noise analog integrated circuits", 2014-05-09, 143 people.
9		Firat Yazicioglu (IMEC), "Low-power interface circuits for bio-potential and physiological signal acquisition", 2014-05-09, 143 people.
10	Lukasz Kotynia (Cadence Poland), "Advanced verification methods of the integrated circuits", 2014-12-03, 64 people.	
11	2015	Willy Sansen (KU Leuven), "Circuits with resistor and capacitor cancellation: design techniques to enhance high-frequency performance without increased power consumption", 2015-10-12- 2015-10-13: 72 people.
12		Tadeusz Asyngier (Tektronix Switzerland), "HI-SPEED INTERFACES: Methodology of measurement with Tektronix Instruments", 2015-06-11, 27 people.
13	2016	Prof. Alberto Sangiovanni-Vincentelli (Edgar L. and Harold H. Buttner Chair of EESC, Dept. of Electrical Engineering and Computer Sciences, University of California, Berkeley, USA, IEEE fellow), "A History of Design Technology: from rubylith cutting and punch cards to swarm systems", 2016-05-24, attendance: 85 people.
14		Prof. Edoardo Charbon, "Single Photon Imagers", 2016-06-01, 48 people.
15		Robert Bogdan Staszewski, Prof. (UCLA, Dublin), Design of Discrete-Time Receivers for the Internet-of-Things, 2017-12-18, 20 people.
16		Robert Bogdan Staszewski, Prof. (UCLA, Dublin), "It is Time to use Time for Digital RF Clock Generation", 2016-06-15, attendance: 51 people. Robert Bogdan Staszewski, Prof. (UCLA, Dublin), Advanced Short Course on "All-Digital Phase-Locked Loops (ADPLL)", 2016-12-08 – 2016-12-09, 83 people.
17		Makoto Ikeda (UNI Tokyo) (IEEE Distinguished Lecturer), "Basics of Asynchronous Circuits Design", "Basics of CMOS Image Sensors", 2016-10-21, 108 people.
18	Hideto Hidaka (Renesas Japan) (IEEE Distinguished Lecturer), "How Future Mobility Meets IT: Embedded Cyber-Physical System Designs Revisit Semiconductor Technology", "Embedded flash memory: technology, circuits to systems and MCU/SOC applications", 2016-10-21, 108 people.	
19	2017	Maciej Książek, (Delphi/Aptiv), "Active safety technologies in 21st century vehicles", 2017-12-11, 33 people.
20		Andrzej Wetula, Paulina Biernacka, Szymon Pocaluń (Merit Automotive), "Software Development Process in Merit Automotive", 2017.11.29, 40 people
21		Robert Bogdan Staszewski, Prof. (UCLA, Dublin), "Patents? The Good, the Bad and the Ugly – A perspective from an industrial inventor turned academic", 2017-11-16, 28 people.
22		Willy Sansen (KU Leuven), "Short Course on Selected Aspects in Analog Microelectronics Design", 2017-10-05 – 2017-10-06, 65 people.
23		Robert Bogdan Staszewski, Prof. (UCLA, Dublin), "Mixed-Signal Electronics to Enable Internet-of-Things", 2017-10-04, 31 people.
24		Prof. Nguyen Truong-Thao (The City College of New York), "The analysis of quantization noise in analog-to-digital conversion", 2017-01-10, 24 people.
25	Design of the discrete-time receivers for the IoT, Prof. Bogdan Staszewski, 18 dec 2017, 20 people.	
26	2018	Using NI Toolchain in post-silicon IC validation, 11 Jun 2018, Wolfgang Rominger, Validation Lead Engineer, NXP Semiconductors Austria, 48 people.
27		Lecture on PLL design for ICs, Kacper Urbanski (Silicon Creations), 25 Oct 2018, 42 people.
28		All-Digital Phase-Locked Loop (ADPLL), 17 Oct 2018, Prof. Bogdan Staszewski, 60 people.
29		Towards A Practically Realizable CMOS Quantum Computer, 16 Mar 2018, Prof. Bogdan Staszewski, 37 people.
30		Lecture on DCO for ADPLL, 15 Nov 2018, Prof. Bogdan Staszewski, 53 people.
31	Lecture on TDCs for ADPLL, 20 Dec 2018, Prof. Bogdan Staszewski, 58 people.	
32	2019	Basics of SAR ADCs: Circuits and Architectures, Pieter Harpe, 21 May 2019,
33		Phase Locked Loop Design, Randy Caplan (CEO Silicon Creations), 9-10 April 2019, 122 people.
34		2-day course on Microelectronic Circuits Design, Prof. Willy Sansen, 10-11 April 2019, 2 day course, 138 people.
35		Quantum Computer On a Chip, KQIS seminar, Prof. Bogdan Staszewski, 55 people.
36		Research activities at University College Dublin – Level Crossing ADC, 21 mar 2019, Prof. Bogdan Staszewski, 55 people.
37		2-day seminar on ESD: basics, circuits, techniques, 30-31 July 2019, Dr Charvaka Duvvury, 63 people.
38	Lecture on Sigma-Delta ADCs and Discrete-Time Receivers for the IoT, Prof. Bogdan Staszewski, 3 Dec 2019, 60 people.	
39	2020	Quantum Computer on a Chip – Lecture by Prof. B. Staszewski, 10 Mar 2020, 18 people.
40		High Resolution Radar Imaging for Breast Cancer Detection: Trends and Challenges, Prof. Andrea Bevilacqua, 16 Dec 2020, 49 people.
41		"Mixed-signal technologies for ultra-wide band signal processing systems" Gabriele Manganaro, 16 Dec 2020, 59 people.
42	2021	Closed-Loop Neuromodulation – Dejan Markovic, 12 Jan 2021, 57 people.
43		RF and mm-Wave Monolithic Integrated Circuits for Wireless Communications – Reza Nikandish, 04 Mar 2021, 30 people.
44		IC Chip and Packaging Interactions in Design for SI, PI, EMC and ESD – Makoto Nagata, 15 Jun 2021, 30 people.
45		Understanding, Mitigation, and Impacts on Wireless Communication Performance – Makoto Nagata, 24 Jun 2021, 33 people.
46		Low-jitter ring-oscillator-based digital PLLs – Jaehyouk Choi, 29 Jun 2021, 30 people.
47		Wireless Power Transmission to Implantable Devices – Maysam Ghovanloo, 12 Jul 2021, 38 people.
48		4-day microelectronics course by Prof. M. Steyaert, 08 Nov 2021 – 11 Nov 2021, 130 people.
49	2022	"Nanoscale FinFET Technology for Circuit Designers" by Alvin Loke, 14 Jan 2022, 55 people.
50		"Frequency Generation for the Internet of Things" by Danielle Griffith, 14 Mar 2022, 74 people.
51		Quantum Computing in Nanoscale CMOS – Prof. Bogdan Staszewski, 06 Apr 2022, 36 people.
52		SerDes Architecture from Impairments by Chung-Chun Chen, 12 May 2022, 77 people.
53		Frequency Synthesis Type One – Sudip Shekhar, 77 people.
54		Discrete-Time Receivers and Filters by Amir Bozorg, 16 Sep 2022, 55 people.



Fig. 5. Attendees of 2-day course by Willy Sansen, April 2019. Center, left to right – Jeff Galloway (CTO, Silicon Creations), Willy Sansen (speaker, KU Leuven, Belgium), Randy Caplan (speaker, CEO Silicon Creations), Pawel Grybos (chapter chair) with the participants of the SSCS Chapter meeting in Cracow in April 2019

Rys. 5. Uczestnicy 2-dniowego kursu prof. Willy'ego Sansena, kwiecień 2019. Na środku, od lewej: Jeff Galloway (CTO, Silicon Creations), Willy Sansen (KU Leuven, Belgium), Randy Caplan (CEO, Silicon Creations), Paweł Gryboś (przewodniczący chapteru SSCS)

conducted by prof. Sansen (2014, 2015, 2017 and 2019, *Fig. 5*). His courses are of particular interest to all analog designers and entry-level to experienced IC designers. Each of his course has gathered substantial amount of participants (approx. 140), even traveling overseas to participate. These memorable events were described in [7][8].

COOPERATION WITH UCD DUBLIN

As a result of long-lasting cooperation between microelectronics groups of prof. Paweł Gryboś (AGH) and prof. Bog-

dan Staszewski (University College Dublin), throughout years many research projects were performed together and a series of lectures were delivered as a part of technical meetings of SSCS Chapter Poland. The topics of the courses were focused on the key activities of prof. Staszewski's group, namely the discrete-time wireless transceivers (2016, 2017, 2019), all-digital PLL's (*Fig. 6*) (2018, 2022) [9] and their key components like the time-to-digital converters (2018) and in general, time-based circuits (2016) as well as quantum computing related circuits (*Fig. 6*) (2018, 2019, *Fig.7*, 2020, 2022), and other topics (2017, 2019). Apart from the professor himself, chapter hosted lectures of UCD researchers, Reza Nikandish (2021) and Amir Bozorg (2022).



Fig. 6. Course on All-Digital PLL by prof. Staszewski gathered participants from across whole Poland

Rys. 6. Kurs profesora Staszewskiego na temat All-Digital PLL zgromadził uczestników z całej Polski



Fig. 7. Attendees of Quantum Computer On a Chip Seminar with Bogdan Staszewski, 2019

Rys. 7. Uczestnicy seminarium Quantum Computer on a Chip wraz z prelegentem, prof. Bogdanem Staszewskim, 2019



Fig. 8. Edoardo Charbon's (EPFL, Lausanne, 5th from the left side) lecture (2016)

Rys. 8. Wykłady prof. Edoardo Charbon (piąty z lewej, dolny rząd), EPFL Lausanne (2016)

OTHER EVENTS

Throughout the years many of the organized events impacted the quality of education in the following years. For example, course on Embedded Software in Automotive, by Fabrice Bedoucha (PSA Peugeot-Citroen at that time, 2014) was converted into organized year-by-year course for students of Microelectronics and is being organized until now.

Visits of Firat Yazicioglu (Galvani Bioelectronics, U.K.) on biomedical microelectronics (2014), Andrea Bevilacqua (University of Padova, Italy) on radar-based breast cancer detection (2020), Maysam Ghovanloo (Silicon Creations) on powering the implantable devices (2021) and Dejan Markovic (UCLA, Los Angeles, USA) on closed-loop neuromodulation (2021), helped to enhance the course on biomedical circuits design.

The primary research interests of the SSCS chapter members at the AGH University is the radiation imaging ICs design, therefore they benefited from visits of researchers focused on this topic, in particular Edoardo Charbon's (EPFL, Lausanne) talk on single-photon imagers (2016) (Fig. 8).

Chapter hosted representatives of Japanese industry and academia, In 2016 a four-lecture event on various aspects of microelectronics, like asynchronous circuits design, embedded memories attracted more than 100 people (Fig. 9) [10]. Later, during pandemic time, Makoto Nagata gave two interesting lectures on chip-level EMC effects (2021).

IMPACT OF THE INDUSTRY

Microelectronics and Electronics industry is active in Poland. Thanks to close cooperation of lecturers as well as students and alumni of electrical and electronics courses being employed by the companies resulted in many interesting events during SSCS Chapter Meeting, e.g. Maciej Książek (Aptiv) has presented challenges of active safety systems design (2017), representatives of Merit Automotive presented various aspects of automotive mechanical systems design and verification (2019). National Instruments measurement equipment is a popular choice for laboratories both in academia and industry. Students are being taught the LabVIEW-based hardware validation techniques (prof. Piotr Maj, AGH) and successfully implement them in their professional careers. Invited lecture by Wolfgang Rominger (NXP) shown the big picture of IC validation using NI toolchain (2018).

Long-lasting cooperation of the SSCS Poland, MTM studies, and Silicon Creations, a U.S.-based company with >100 people design office in Kraków, Poland resulted in many co-organized lectures, courses and events. Since the key product lines of the company are the IC clocking solutions (in particular: Phase-Locked Loops, crystal oscillators, on-chip oscillators) and high-speed interfacing circuits (SerDes, PMAs, or Physical Media Attachment circuits, LVDS, CML), the events' topics were closely related to them.

In 2018, Kacper Urbański (Silicon Creations and a student of MTM) returned with a lecture on various aspects of the PLL design for the ICs. A year later, Randy Caplan (CEO),



Fig. 9. In 2016 SSCS Hosts representatives of Japanese industry and academia: Makoto Ikeda (UNI Tokyo), on the right, and Hideto Hidaka (Renesas), center

Rys. 9. W roku 2016 chapter SSCS gości przedstawiciele japońskiego przemysłu i uniwersytetów: Makoto Ikeda (UNI Tokyo), po prawej, oraz Hideto Hidaka (Renesas), na środku

gave a lecture on PLL design for the attendees of the latest Willy Sansen's course co-organized by Silicon Creations (Fig. 5), (Fig. 10). He introduced the PLL design concepts as well as basics of various types of jitter, varying requirements of different target applications as well as the system-level challenges.

Later, in 2019, an ESD expert, author of several topical books and publications, Charvaka Duvvury delivered a two day course on the origins of the electrostatic discharge, methods of emulating it in the laboratory environment (HBM, MM, CDM discharge models) as well as off-chip and on-chip protection circuits emphasizing the facts that successful circuit and systems design against ESD events is strictly empirical but increasingly important when the feature sizes in the new process nodes become smaller and smaller (Fig. 11).

Later, leveraging from SSCS's distinguished lecturers program, clocking-related lectures were organized during pandemic times: Jaehyouk Choi (KAIST) introduced low-jitter ring-oscillator based digital PLLs (2021), low-power clocking solutions for the IoT were presented by Danielle Griffith (Texas Instruments) and recently, in 2022, Sudip Shek-



Fig. 10. Randy Caplan (CEO, Silicon Creations) during his talk on PLL design, 2019

Rys. 10. Randy Caplan (CEO, Silicon Creations) podczas wystąpienia na temat projektowania układów PLL, 2019



Fig. 11. Charvaka Duvvury (left) and Randy Caplan (right) during the course on ESD: basics, circuits, techniques, 2019

Rys. 11. Charvaka Duvvury (po lewej) i Randy Caplan (po prawej) podczas kursu na temat ESD, 2019



Fig. 12. Attendees of the 2022, first post-pandemic event in Kraków, CC Chen (Silicon Creations) "SerDes Architecture from Impairments"
Rys. 12. Uczestnicy pierwszego po rozpoczęciu pandemii wydarzenia typu in-person, AGH w Krakowie, 2022



Fig. 13. Alberto Sangiovanni-Vincentelli during his talk on evolution of the microelectronics design tools, 2016
Rys. 13. Alberto Sangiovanni-Vincentelli podczas wystąpienia na temat rozwoju narzędzi do projektowania układów mikroelektronicznych, 2016

har (University of British Columbia) introduced the concept of frequency synthesis type one.

In 2021, Silicon Creations sponsored an open-to-public, 4-day course by prof. Michiel Steyaert (KU Leuven), author of many books based on successful research and industrial projects, on various aspects on microelectronic circuit design, in particular low phase-noise LC oscillators, sigma-delta ADCs as well as power converters. This course greatly extended the related topics discussed (also by prof. Steyaert) during commercial courses by Mead Education (Lausanne, Switzerland).

Lastly, the memorable, first post-pandemic on-site event took place in May 2022, when Chun-Chung Chen (Director of Analog and Mixed Signal Design, Silicon Creations) has presented methods of mitigating impairments in the high-speed SerDes circuits (Fig. 12).

Alberto Sangiovanni-Vincentelli, a co-founder of Cadence Design Systems and Synopsys, two key companies for microelectronics world in terms of design automation tools and IP delivery, has visited AGH and gave a talk as a SSCS Chapter Poland Meeting on evolution of the design tools starting from manual, rubylith cutting (2016, [11], Fig. 13). Years later, in 2022, he returned to receive the doctorate honoris-causa from AGH University [14].

Very important task for all our chapter members was the preparation for ESSCIRC/ESSDERC 2019 in Poland in September 2019 (see: <https://esscirtc-essderc2019.org> – see also short video at the conference web page)

23-26 September 2019. With about 550 participants from 42 countries, ESSDERC and ESSCIRC in Cracow was a great event. Statistically, 48% of participants came from academia, 38% came from industry, and 14% came from Research & Development (R&D) centers, clearly demonstrating how important this conference is for industry and R&D centers. The aim of ESSDERC and ESSCIRC is to provide an annual European forum for the presentation and discussion of recent advances in solid-state devices and circuits. Both ESSDERC and ESSCIRC run in parallel, share Plenary Keynote Presentations, and are governed by a joint Steering Committee. The conferences are technically co-sponsored by IEEE,

and are financially sponsored by SSCS (ESSCIRC) and EDS (ESSDERC). The conferences in Cracow were co-organized by the AGH University of Science and Technology in Cracow, Jagiellonian University in Cracow, Warsaw University of Technology and Centre for Advanced Materials and Technologies CEZAMAT in Warsaw. The conference chairs were Pawel Grybos (AGH UST, Krakow) and Maciej Ogorzalek (Jagiellonian University Krakow), while the

TPC Chair of ESSDERC was Thomas Skotnicki (Warsaw University of Technology and CEZAMAT) and the TPC Chair of ESSCIRC was Bogdan Staszewski (UCD University College Dublin) (Fig. 14).

ESSCIRC/ESSDERC 2019 CONFERENCE

The 49th European Solid-State Device Research Conference (ESSDERC) and the 45th European Solid-State Circuits Conference (ESSCIRC) was organized in Cracow, Poland, on

PAPER SUBMISSION

The real success of a conference is based on the support of all the authors who submitted their papers to the conference. In 2019, the ESSDERC-ESSCIRC received a total of 345 submissions, of which 235 contributed to ESSCIRC,



Fig. 14. Steering Committee and Organizing Committee of ESSDERC/ESSCIRC 2019 in Cracow
Rys. 14. Komitety organizacyjne konferencji ESSDERC/ESSCIRC 2019 w Krakowie

**MEMBERS OF EACH
 15 TRACKS SEATING AT
 A ROUND TABLE SELECTED
 IN TOTAL 164 BEST PAPERS
 GROUPED INTO 40 REGULAR
 AND 3 FOCUS SESSIONS.**

and 110 to ESSDERC. About 56% of the submissions came from Europe, 24% from Asia, and 20% from North America, clearly demonstrating the international character of the conference. The TPC held a meeting on May 20th in Warsaw in the Centre for Advanced Materials and Technologies CEZAMAT. Members of each 15 tracks seating at a round table selected in total 164 best papers grouped into 40 regular and 3 focus sessions.

JOINT PLENARY

The conference had four plenary keynote speakers (*Fig. 15*). Edoardo Charbon (EPFL) gave the talk “Cryo-CMOS: 60 Years of Technological Advances towards Emerging Quantum Technologies”, Franck Arnaud (STMicroelectronics) presented “28nm FDSOI platform with embedded PCM for IoT, ULP, digital, analog, automotive and other applications”, Toshio Yanagida (Osaka University) delivered the talk “Single-Molecule Nano-Science: Noise



Fig. 15. Conference session in Auditorium Maximum, Jagiellonian University, 2019
Rys. 15. Sesja konferencji w Auditorium Maximum, Uniwersytet Jagielloński, 2019

and Function of Life” and Donhee Ham (Harvard University) presented “Copying brain with semiconductor technology”.

ESSCIRC KEYNOTE

ESSCIRC featured three keynote presentations. Ram K. Krishnamurthy (Intel) gave the talk “Machine learning and hardware security technologies for the IoT era: Challenges and Opportunities”, Jeff Walling (Tyndall National Institute) presented “Leveraging the Switched Capacitor Power Amplifier for Future Communications Systems” and Pieter Harpe (TU Eindhoven) delivered the talk “Low-power SAR ADCs: trends, examples and future”.

ESSDERC KEYNOTE

ESSDERC also featured three keynote presentations. Michael Heuken (AIXTRON SE) gave the talk “GaN based HEMT technology for power and RF applications”, Subhasish Mitra (Stanford University) presented “The N3XT 1,000X for the Coming Superstorm of Abundant Data: Carbon Nanotube FETs, Resistive RAM” and Jong-Ho Lee (Seoul National University) delivered the talk “Review of promising devices for neuromorphic applications”.

TUTORIALS

On Monday 23rd September 2019, there were seven excellent tutorials and a SINANO workshop, with over 200 participants. The parallel tutorial presentation covered topics as nanoscale technology and transistor modeling, circuits and systems enabling quantum technologies, 5G Radios, low-power RF and analog circuits, jitter and phase noise, and THz technologies and IoT devices. These provided extra opportunities for updating knowledge in the state-of-the-art technology in the areas covered. Selected tutorials were recorded in the frame of the SSCS Education Program, and the SSCS will release these recordings free of charge to members in the coming months.

SSCS DIVERSITY LUNCHEON

The SSCS Women in Circuits Group sponsored a luncheon on 24th September 2019 on how to increase diversity in the SSC community (Fig. 16). The luncheon featured talks by industry and academic professionals sharing their experience in their careers where a challenge, project, or mentor helped them becoming a better engineer and problem solver. The meeting was chaired by Viola Schäffer (Texas Instruments), and the panelists in the discussion were Kofi Makinwa, (Delft University), Téa Williams (Texas Instruments), and Maud Vinet (CEA-Leti).



Fig. 16. Kofi Makinwa delivers the talk during SSCS Diversity Luncheon, 2019
Rys. 16. Kofi Makinwa podczas SSCS Diversity Luncheon, 2019



Fig. 17. Young Professionals Micro-Mentoring and Career Coaching Event, 2019
Rys. 17. Sesja mentoringu podczas wydarzenia IEEE Young Professionals, 2019

more than 60 young engineers and students. Student volunteers played an important role in ensuring the success of the ESSDERC/ESSCIRC conferences.

SSCS YOUNG PROFESSIONALS EVENT

On 23rd September 2019, the IEEE Poland Section and SSCS organized the Young Professionals and Students Micro-Mentoring and Career Coaching Session, which gathered over 50 participants (Fig. 17). During the event, leading experts from industry and academia shared their experiences with

POST-CONFERENCE PUBLICATIONS AND AWARDS

All presented ESSDERC and ESSCIRC papers were sent to IEEE Xplore after the conference. Authors of outstanding articles from ESSCIRC were invited to submit their work to the Special Issue of IEEE Journal of Solid-State Circuits,



Fig. 19. Welcome Reception in the AGH University of Science and Technology in Cracow, 2019
Rys. 19. Powitanie uczestników konferencji ESSCIRC/ESSDERC w AGH w Krakowie, 2019

while authors of outstanding ESSDERC papers were invited to the Special Issue of IEEE Journal of the Electron Devices Society. For the first time in the history of ESSCIRC, there will be co-publication of qualified papers in Solid-State Circuits Letters. As many as 38 outstanding ESSCIRC papers after additional editorial and quality reviews have been accepted to the Special Issue of IEEE Solid-State Circuit Letters and was posted online.

SOCIAL EVENTS

The conference also included an extraordinary social program. During the Welcome Reception at the AGH University of Science and Technology in Cracow (Fig. 19), participants met with the representatives of national and local authorities. The reception was kicked off by reading a letter aloud to participants written by President of the Republic of Poland. The President warmly welcomed the conference participants and emphasized how important Poland is in its active participation in the development of microelectronics. The honorary patrons of ESSDERC and ESSCIRC were: the Ministry of Entrepreneurship and Technology; the Ministry of Science and Higher Education; the Ministry of Digital Affairs; the Mayor of Warsaw; the Mayor of Cracow; the Rector of the AGH University of Science and Technology, Cracow; the Rector of the Jagiellonian University, Cracow; and the Rector of Warsaw University of Technology.

The Gala Dinner took place in the Wieliczka Salt Mine (Fig. 20). This salt mine is among the oldest salt mines in Europe and appears in the UNESCO List of World Cultural Heritage. During the Gala dinner, the Obsession quartet gave a short concert – their program was a musical and humorous journey through the world of sounds that surround all of us, regardless of our musical preferences. These



Fig. 19. Welcome Reception in the AGH University of Science and Technology in Cracow, 2019
Rys. 19. Powitanie uczestników konferencji ESSCIRC/ESSDERC w AGH w Krakowie, 2019



Fig. 20. The Gala dinner at the Wieliczka Salt Mine, 2019
Rys. 20. Kolacja konferencyjna w Kopalni Soli w Wieliczce, 2019



Fig. 21. The Corporate sponsors of ESSDERC/ESSCIRC 2019
Rys. 21. Przedstawiciele sponsorów konferencji ESSDERC/ESSCIRC 2019

social events offered ample opportunities for networking. Corporate sponsors of ESSCIRC/ESSDERC in Cracow (Fig. 21) were Rigaku Corporation, Xilinx, SK Hynix, Silicon Creations, ABB, TechInsights, Cadence Academic Network, Nordic Semiconductor, Micron Foundation, Analog Devices, XFAB, SCALINX, KIOXIA Corporation, STMicroelectronics, EURO-PRACTICE, Cambridge University Press, Springer, and River Publishers.

SUMMARY

During ten years of chapter's presence in Poland, active education of young students, researchers and industrial professionals resulted in substantial growth of the microelectronic industry with headquarters or subsidiaries in Poland. We look forward to the exciting future in microelectronics world and will keep on fulfilling goals of the SSCS Chapter Poland mission.

Board of IEEE SSCS Chapter Poland would like to thank all the people and institutions that contributed to the organization of all the events.

Paweł Gryboś (Chapter Chair 2013–2020)

Krzysztof Kasiński (Chapter Chair 2021–now) ❖

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