

State Key Laboratory of Analog and Mixed-Signal VLSI (AMSV) Institute of Microelectronics (IME)

University of Macau

Newsletter
(2022 Milestones)

| Year 12 |
| No.12 |

ORGANIZATIONAL CHART

Academic Team 學術團隊

Management 管理



Prof. Rui MARTINS
馬許爾教授
IEEE Fellow IEEE會士
Director of IME
微電子研究院院長
Founding Director of SKL-AMSV (2011-2022)
國家重點實驗室原主任 (2011-2022)



Prof. Pui In MAK
麥沛然教授
IEEE Fellow IEEE會士
Director of SKL-AMSV
國家重點實驗室主任
Deputy Director (Research) of IME
微電子研究院副院長 (研究)



Prof. Sai Weng SIN
冼世榮副教授
Deputy Director of SKL-AMSV
國家重點實驗室副主任
Deputy Director (Academic) of IME
微電子研究院副院長 (學術)



Prof. Franco MALOBERTI
Chair of SKL Academic Committee
(Scientific Advisory Board)
實驗室學術委員會主席



Prof. Man Kay LAW
羅文基副教授
Laboratory Infrastructure Coordinator
實驗室基礎設施協調主任



Prof. Yan ZHU
諸嫻副教授
Industrial Collaboration Coordinator
產業合作協調主任



Prof. Yan LU
路延副教授
Microelectronics Center / ZUMRI Coordinator
珠海澳大科技微電子研發中心主任

Wireless and Multidisciplinary Research Group (WMRG) 無線和多學科研究組



Pui In MAK
麥沛然
Full Professor
教授



Man Kay LAW
羅文基
Associate Professor
副教授



Sio Hang PUN
潘少恆
Associate Professor
副教授



Jun YIN
殷俊
Associate Professor
副教授



Sai Weng SIN
冼世榮
Associate Professor
副教授



Yan ZHU
諸嫻
Associate Professor
副教授



Chi Seng LAM
林智聲
Associate Professor
副教授



Yan LU
路延
Associate Professor
副教授



Yong CHEN
陳勇
Associate Professor
副教授



Yanwei JIA
賈懿偉
Associate Professor
副教授



Ka Fai UN
阮家輝
Assistant Professor
助理教授



Ka Meng LEI
李家明
Assistant Professor
助理教授



Chi Hang CHAN
陳知行
Associate Professor
副教授



Mo HUANG
黃沫
Assistant Professor
助理教授



Minglei ZHANG
張明磊
Assistant Professor
助理教授



Mingqiang GUO
郭銘強
Assistant Professor
助理教授



Yang JIANG
江洋
Assistant Professor
助理教授



Wei Han YU
于維翰
Assistant Professor
助理教授



Yatao PENG
彭亞濤
Assistant Professor
助理教授



Fangyu MAO
毛方玉
Research Assistant Professor
研究助理教授



Wenliang ZENG
曾文良
UM Macau Fellow
澳大濠江學者

NEW

NEW

NEW

Administrative and Technical Team 行政技術團隊



Fan NG, Leo
吳凡
Functional Head (Operation)
事務主管 (運行)



Un Pang LEI, Lewis
李遠騰
Functional Head (Technical)
事務主管 (技術)



Bin ZHOU, Jet
周斌
Technology Transfer Officer
技術轉移主任



Chi Wai TANG, Kevin
鄧志偉
Laboratory Technician - Safety Officer
實驗室技術員 - 安全主任



Yuen Ki CHAN, Elizabeth
陳婉琪
Administrative Officer
行政主任



Jie GAO, Jennie
高潔
Laboratory Technician - Safety Officer
實驗室技術員 - 安全主任



Jianyu ZHONG, Jankey
鍾健瑜
Laboratory Technician
實驗室技術員



Pui Wan SOU, Jenny
蘇佩雲
Senior Administrative Assistant
高級行政助理



Sut Wai IEONG, Hedy
楊雪慧
Administrative Assistant
行政助理

ACADEMIC COMMITTEE

SKL Academic Committee (12 IEEE Fellows)
國家重點實驗室學術委員會 (12名IEEE會士)

2012-2023



Prof. Franco MALOBERTI
IEEE Fellow
University of Pavia



Prof. Zhiliang HONG
Fudan University



Prof. Howard Cam LUONG
IEEE Fellow
Hong Kong University of Science
and Technology



Prof. Akira MATSUZAWA
IEEE Fellow
Tokyo Institute of Technology



Prof. Bram NAUTA
IEEE Fellow
University of Twente * 3



Prof. Behzad RAZAVI
IEEE Fellow
University of California,
Los Angeles * 2



Prof. Zhihua WANG
IEEE Fellow
Tsinghua University



Prof. Hoi-Jun YOO
IEEE Fellow
Korea Advanced Institute of
Science and Technology

2018-2023



Prof. Baher HAROUN
IEEE Fellow
Texas Instruments



Prof. Ming LIU
IEEE Fellow
IME of Chinese Academy
of Sciences * 1



Prof. Boris MURMANN
IEEE Fellow
Stanford University



Prof. Robert Bogdan STASZEWSKI
IEEE Fellow
University College Dublin



Prof. Peter Chung-Yu WU
IEEE Fellow
Yang Ming Chiao Tung University

13 eminent IC experts(12 IEEE Fellows) 13名傑出的IC專家 (12名IEEE會士)

3 Academicians(China,US and The Netherlands) 3名院士 (中國,美國和荷蘭)

* 1:Member of the Chinese Academy of Sciences 中國科學院院士

* 2:Member of the United States National Academy of Engineering 美國國家工程院院士

* 3:Member of the Royal Netherlands Academy of Arts and Sciences 荷蘭皇家藝術與科學學院院士

INTRODUCTION

The laboratory was established by the University of Macau to conduct cutting-edge research on state-of-the-art electronics and other related emerging fields with research emphasis in analog and mixed-signal circuits specially focusing in wireless/wireline RF transceivers and data converters for high-speed and low-power applications. The laboratory also actively develops research in power management circuits and microfluidic chips, developing solutions for Lab-on-Chip and eventually Lab-on-CMOS applications.

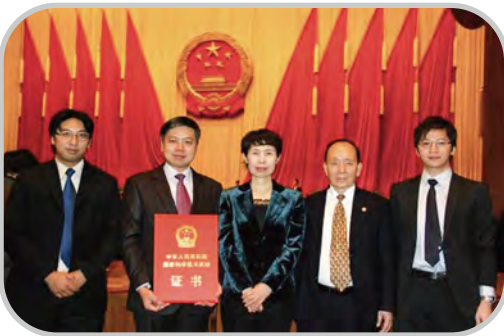
The core research team of the laboratory (SKL-AMSV) is mainly composed (50%) by Macau talents born and trained at all levels up to the PhD in the University of Macau. In 2022, it has attracted 1 chair professor, 1 adjunct chair professor (visiting), 1 full professor, 10 associate professors, 8 assistant professors, 1 UM Macau fellow and 1 Research Assistant Professor, among them 3 are IEEE Fellows (USA).



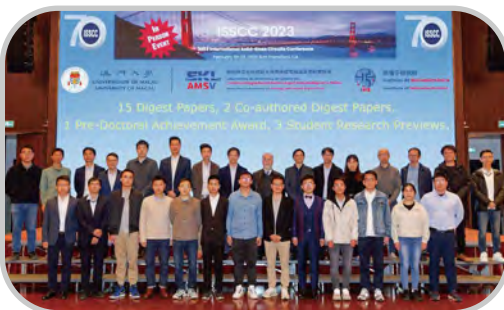
President Xi Jinping visits the University of Macau and knows about the research development of SKL-AMSV, 2014



Macao S&T Awards - 1st Class
Technological Invention Award, 2020



The first awardee of the National Science and Technology Progress Award from Macau, 2011



A group photo of the research team at ISSCC 2023

There are also several post-docs and 260+ doctoral and master students. The dominant expertise of the lab in state-of-the-art electronics reached world-top standards in the field. The testing equipment is also advanced and quite unique in the Greater Bay Area. By December 2022, the laboratory published 12 books and chapters, 451 international refereed journal articles and 296 international conference papers, 45 of which were published in the most prestigious electronics conference in the world - the International Solid-State Circuits Conference (ISSCC), that takes place every year in San Francisco, USA. SKL-AMSV will present 15 chips/papers in ISSCC 2023, ranking No.1 in the world. Furthermore, during the same period the lab had 46 patents, 8 Chinese patents, 3 Taiwan patents and 35 patents granted by the United States. Several works from the lab are already in practical use in a wide range of electronic equipment, achieving technology transfer. In addition, the lab's research team won the second prize of the 2011 National Science and Technology Progress Award, for the first time attributed to a team from Macau, and numerous FDCT awards in particular the 1st prize in Technological Invention also attributed for the first time in Macau in 2020. Prof. Rui Martins, Founding Director (2011-2022) of the SKL-AMSV, received Medal of Merit from Macao SAR Government in 2022, in recognition of his outstanding contribution to education. Moreover, Prof. Mak Pui-In, Director of the SKL-AMSV, being the first and only scholar from Macau to receive the Xplorer Prize in 2022.

Besides, the lab's research team won the 2010 Ho Leung Ho Lee Science and Technology Innovation Award, 5 medals from the Central and Macau SAR governments, and 1 of its members was recently elevated to the Chinese Academy of Sciences as a Foreign Expert.

INTRODUCTION

- ✓ **Benchmark** with top national academic institutions in terms of **state-of-the-art chips** in **IEEE ISSCC**, San Francisco, USA

按**前沿芯片成果**於**國際固態電路會議**與我國頂級學術機構的比較



Academy in China	2011-2015	2016-2020	2021	2022	2023	Total
University of Macau 澳門大學 ★	9	30	2	4	15	60
Tsinghua University 清華大學	3	8	6	8	14	39
HKUST 香港科技大學	11	11		1		23
Fudan University 復旦大學	5	6		3	3	17
Peking University 北京大學		2	4	5	6	17
Chengdu UESTC 電子科技大學		4	3	1	5	13
Zhejiang University 浙江大學			2	3	3	8
Chinese Acad. Sci. 中國科學院	3		1		4	8
Southeast University 東南大學		2	1		3	6
Univ. of S&T of China 中國科學技術大學			1	2	1	4
Shanghai Jiaotong U. 上海交通大學		2			1	3
Tianjin University 天津大學		1		1		2
Xi'an Jiaotong U. 西安交通大學		1				1
CityUHK 香港城市大學					1	1

Awards 獎項

1 x Far-East Best Paper Award

遠東傑出論文獎

(1st in China 中國首獲)

8 x SSCS Pre-Doctoral Achievement Award

博士生成就獎

2 x ISSCC Silkroad Award

絲綢之路獎

1 x ISSCC Student Research Preview Award

學生研究海報獎

18 x ISSCC Student Research Preview

學生研究海報

Thirteen consecutive years (2011-2023) in ISSCC with 60 papers! 連續13年於國際固態電路會議發表了60篇論文!

Rank 排名	2023	Paper 論文數量
1	University of Macau 澳門大學	15
2	Tsinghua University 清華大學	14
3	Delft University of Tech. 荷蘭台夫特理工	9
4	KAIST (South Korea) 南韓科學技術院	8
4	SAMSUNG * 三星電子	8

Rank 排名	2019	Paper 論文數量
1	Intel * 英特爾	10
2	Mediatek * 聯發科技	8
2	University of Macau 澳門大學	8
2	Univ. of Michigan—Ann Arbor 密歇根大學 安娜堡校區	8

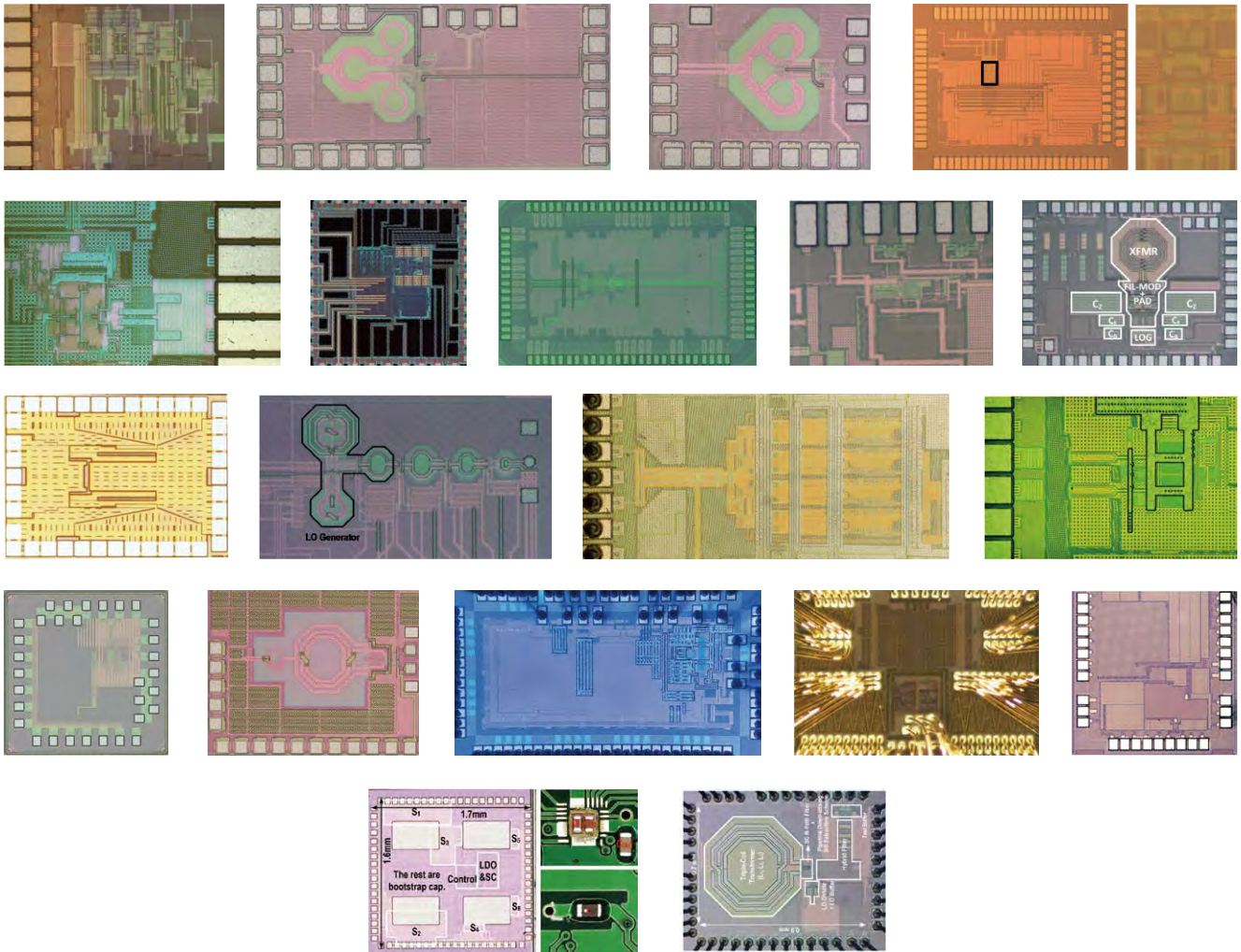
* Multi-countries in Worldwide 包括世界多個國家

World Organization Ranking 世界機構排名 ■ 2023: 1st ■ 2019: 2nd

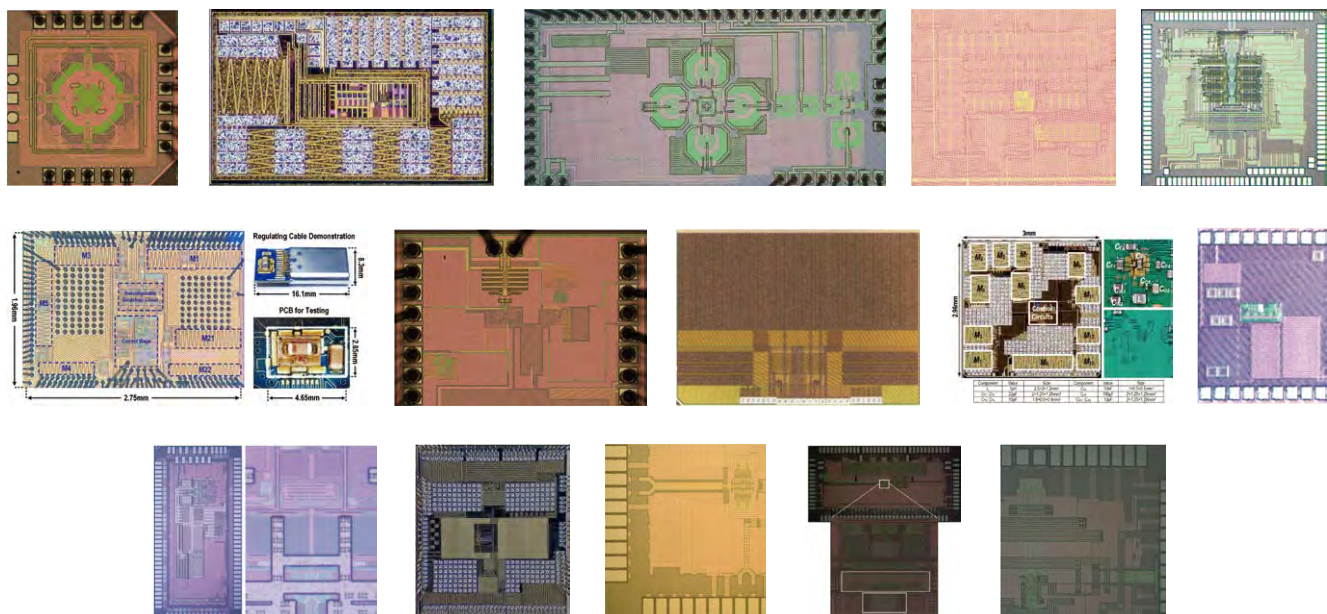
Benchmark with top national academic institutions in terms of state-of-the-art chips in ISSCC

INTRODUCTION

ISSCC Chips - presented in ISSCC 2019 – 2022



ISSCC Chips – presented in ISSCC 2023



Master of Science in Microelectronics 理學碩士學位（微電子學）課程

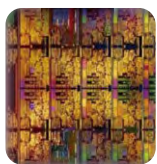
Master of Philosophy in Microelectronics 哲學碩士學位（微電子學）課程

- 澳門大學提供兩個微電子學碩士課程
 - 理學碩士學位（微電子學）課程：適用於培養業界工程師人才
 - 哲學碩士學位（微電子學）課程：研究型人才
- 華南地區唯一的微電子國家重點實驗室，在IEEE國際固態電路會議（ISSCC）上發表了大量論文（2023年在全球學術/產業機構中排名第1位）
- UM offers two Master Programmes in Microelectronics:
 - Master of Science in Microelectronics: to train the talents and advanced engineers
 - Master of Philosophy in Microelectronics: for research talents
- The only State Key Laboratory of Microelectronics in South China, published a high number of publications in the world - renowned flagship conference - the International Solid - State Circuits Conference (ISSCC) 1st in the World in 2023

所提供的課程 Courses Offered



模擬集成電路
Analog IC Design



數字集成電路
Digital IC Design



無線/有線
Wireless/Wireline



模數/數模轉換
Data Converters



電源管理
Power Management



生物科技
Biomedical



人工智能
Machine Learning



傳感器/物聯網
Sensors/IoT Interfaces



<https://ime.um.edu.mo/zh-hant/programme-educational-objectives/>

INTERNATIONAL COLLABORATION 國際合作



Companies in Greater Bay Area and beyond 大灣區工業界



Wireless charging System

As smart devices and electric transportations reshape our life, there is a growing demand for more efficient and autonomous charging solutions. Traditional battery solutions that require manual management and manual plugging and round-the-clock rotation are becoming increasingly infeasible. In the future, therefore, charging solutions should be more autonomous, that is, allowing devices to work efficiently without human hands.

A research team led by Associate Professor Chi-Seng Lam of the State Key Laboratory of Analog and Mixed-Signal VLSI (SKL-AMSV) & Institute of Microelectronics (IME) in the University of Macau focuses on a wireless charging solution with higher compatibility and better power transmission performance, such that different types of devices can be charged by using the same wireless charging base. The developed wireless charging system is characterized by its high charging efficiency of up to 94 per cent. The team has developed wireless charging solutions for several applications, such as: electric kart, electric motorcycle, automated guided vehicle for logistics, and multiple-coil continuous charging demonstration sandbox for warehousing. The wireless charging prototypes has been successfully exhibited at the 7th and 8th Macau Industrial Products Show in 2020 and 2022, University of Macau Open Day in 2021, the Macau Science and Technology Week and Scientific Innovation Achievement Exhibition in 2021 and 2022, respectively. Also, the outcomes are well recognized by UM, some Macau companies and media (i.e. TDM, Macao Daily News).

This project has been supported by the Science and Technology Development Fund of Macau SAR (FDCT) and the University of Macau. Three papers have been published by the prestigious international journals of power electronics, and a total of 10 papers have been published by IEEE international conferences. One of them was awarded the 11th IEEE PES Asia-Pacific Power and Energy Engineering Conference 2019 Best Paper Award [in topic of Electric and Hybrid Vehicles]. In addition, one US invention patent has been granted and five Chinese invention patents are in pending.

Since 2020, with the great support by the SKL-AMSV & IME of the University of Macau, the team has tried to industrialize the research results and participated in several national and regional entrepreneurship competitions and won 9 awards in total, including the silver award of the 6th China International “Internet +” College Students’ Innovation and Entrepreneurship Competition and the third prize of the 5th Dapeng New District Innovation and Entrepreneurship Competition. Also, the team creates a local spin-off technology company, named as Smarmac Technology Ltd., of which the goal is to promote and gradually realize the industrialization of wireless charging technology and other self-developed power electronic technologies. Now, the team targets to the market of electric motorcycle with wireless charging in Macau and keep the tight cooperation with local motorcycle companies from Macau.



已具有無線充電的物流倉儲展示沙盤模型



區間式無線充電



動態式無線充電



Digifluidic Biotech Ltd. <http://digifluidic.com>

Digifluidic Biotech Ltd. is a young and dynamic biotechnology company founded in 2018.

With digital microfluidics as the core technology and automatic nucleic acid analysis system as the main product, Digifluidic is committed to developing precise automatic in vitro diagnostic equipment, whose application fields include medical disease diagnosis, animal and plant disease detection, health index detection, import and export inspection and quarantine, food safety detection, etc., which shows infinite possibilities in the future.

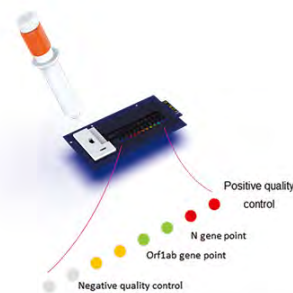
The nucleic acid detection equipment developed by Digifluidic at this stage has the characteristics of small size, easy to carry, simple operation and low cost. It solves the problems that traditional nucleic acid detection requires complex personnel operation and special detection sites. In the future, Digifluidic plans to cooperate with government agencies and scientific research institutions in different fields to develop various detection applications with different detection methods. In the medical field, Digifluidic aims to improve patient care, reduce costs and improve laboratory efficiency; in the non-medical field, Digifluidic aims to develop a variety of applications, improve people's quality of life and efficiency, and provide greater driving force for the future development of precision, automation and miniaturization of detection equipment.



Virus Hunter BIOCHIP-BASED MINIATURE qPCR Detection Platform

SIMPLE × FAST × ACCURATE × LOW PRICE

- LOW-COST NUCLEIC ACID AMPLIFICATION/
1.5UL REACTION SYSTEM
- MULTIPLE REAGENTS LYOPHILIZATION AND PRESTORE/
UP TO 12 PRESTORED REACTION POINTS
- AUTOMATIC SAMPLE LOADING/
DIGITAL MICROFLUIDIC
- CLINICAL POINT-OF-CARE TESTING/
SMALL AND PORTABLE

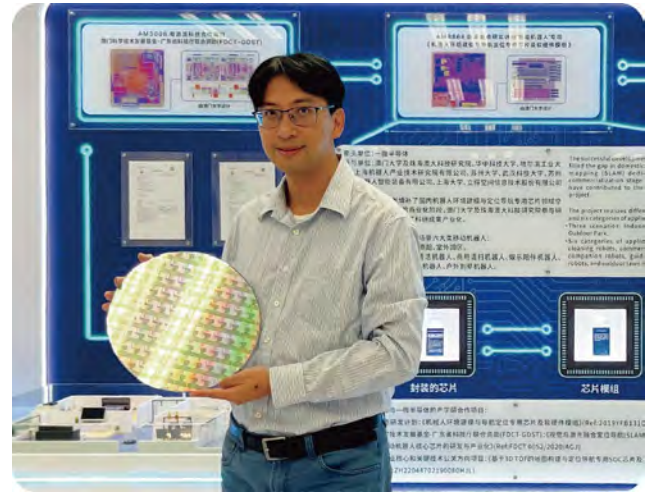


The first spin-off company of UM

R&D of Robotic Simultaneous Localization and Mapping – MaNSoC

The successful development of the National Key R&D project has filled the gap in domestic robot simultaneous localization and mapping (SLAM) dedicated chips. It has entered the commercialization stage of trial production. UM and ZUMRI has contributed to the R&D of the low-power ADC in the project.

The project realizes different mobile robots in three scenarios and six categories of application demonstrations:



- Three Scenarios: Indoor Home, Indoor Supermarket, and Outdoor Park.
- Six categories of applications demonstration: household cleaning robots, commercial cleaning robots, entertainment companion robots, guide and tour robots, outdoor patrol robots, and outdoor lawn mowing robots.

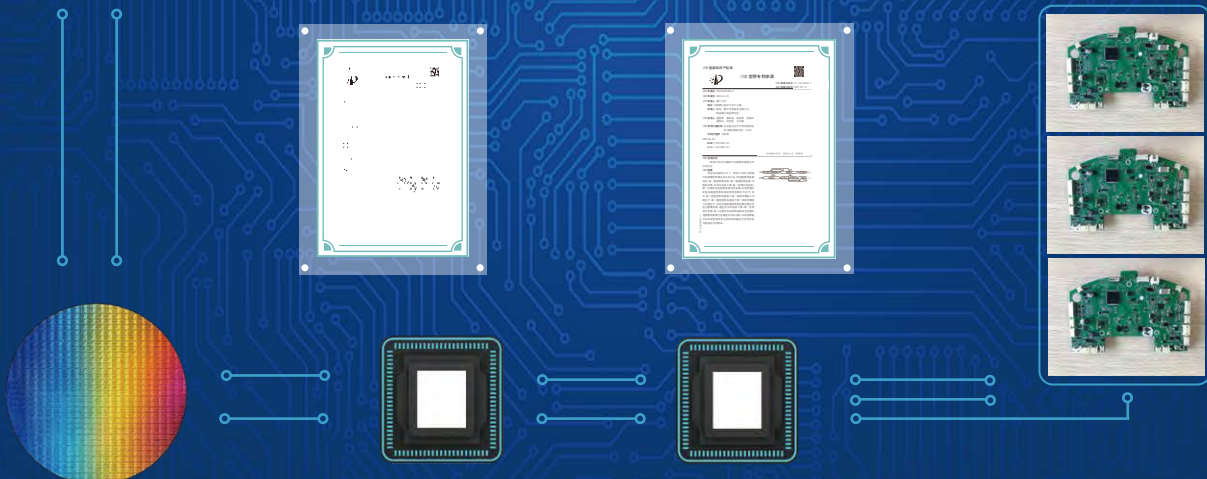
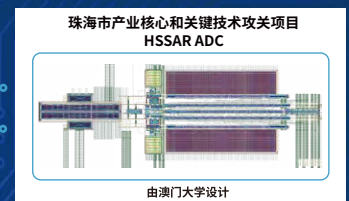
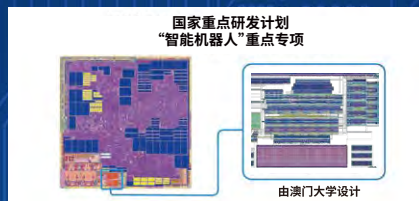
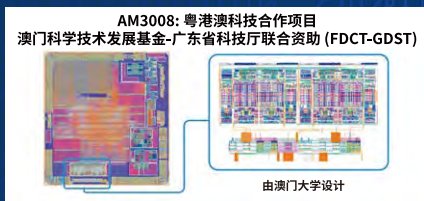
澳门大学 x 一微半导体 UM x AMICRO

科研成果产业化展示 - 国家重点研发计划

Industrialization Demonstration - National Key R&D Program of China

《机器人环境建模与导航定位专用芯片及软硬件模组》

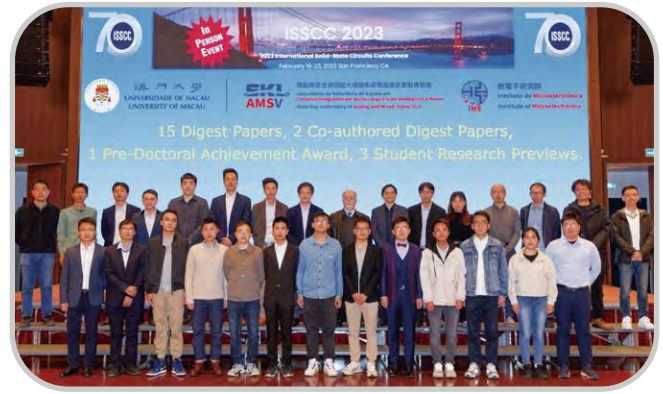
R&D of Robotic Simultaneous Localization and Mapping - MaNSoC



EVENTS AND VISITS



Yang Zhenwu, secretary-general of the Standing Committee of the National People's Congress (NPC) and secretary of its Party Leadership Group, visited University of Macau (UM) and recognized the fruitful research results of the State Key laboratories.



The SKL-AMSV has published papers on ISSCC, the "Chip Olympics", for 13 consecutive years, and the number of papers published in ISSCC 2023 is the first in the world.



An opening ceremony for the new location of the Zhuhai UM Science & Technology Research Institute (ZUMRI)'s Microelectronics R&D Center in the Guangdong-Macao In-Depth Cooperation Zone in Hengqin.



Prof. Rui Martins, Director of the IME at UM received ISSCC Top Contributors Award (ranked 6th in 70 years of ISSCC history).



Prof. Mak Pui In, Director of the SKL-AMSV was awarded the Xplorer Prize 2022.



The Institute of Microelectronics (IME) at UM and ZUMRI jointly held a forum for scholars and industry practitioners in microelectronics to discuss the latest developments in the industry. The event also aimed to match companies in Hengqin and Macao with integrated circuit (IC) professionals.



Chan Pak Ian, a PhD student in the Department of ECE of FST, the SKL-AMSV, and the IME at UM received the certificate of merit from the Macao SAR government.

EVENTS AND VISITS



Visit by Xu Yanhao, Deputy Secretary of the Leading Party Committee of the China Association for Science and Technology and member of the Standing Committee of the National People's Congress.



Visit by Lu Shan, Vice Governor of Zhejiang Province.



Visit by a delegation from the Ministry of Science and Technology of China.



Visit by Ming Wenjun, Director General of the Art Department of the Ministry of Culture and Tourism of China.



Visit by a delegation of Science and Technology Department of Shandong Province.



Visit by a delegation of Science and Technology Department of Jiangxi Province.



Visit by faculty members from the School of Integrated Circuit, UNAA and participated in SKL-AMSV microelectronics training class.



Visit by a delegation of Shenzhen Science and Technology Innovation Commission.

EVENTS AND VISITS



Visit by a delegation of Liaison Office of the Central People's Government in the Macao SAR.



Visit by a delegation of Macao Science and Technology Development Fund (FDCT).



visit by a delegation from the Legislative Council of Macao.



Visit by a delegation from Hengqin Guangdong-Macao In-depth Cooperation Zone Committee.



Visit by Sun Xiangyang, Deputy Special Commissioner of the Office of the Special Commissioner of the Chinese Foreign Ministry in Macao.



Visit by a delegation from Shenzhen Greater Bay Area Office, Shenzhen Foreign Affairs Office and Shenzhen Futian District Government.



Guangdong Satellite TV visited and interviewed Prof. Mak.



Visit by a delegation of Hengqin Affairs Committee of Guangdong Provincial Party Committee.

For enquiry, please contact:

E-Mail: amsv.enquiry@um.edu.mo

Location: State Key Laboratory of Analog and Mixed-Signal VLSI, AMSV,
Research Building N21, 3/F University of Macau,
Avenida da Universidade, Taipa, Macau, China

Telephone: (+853) 8822-4700

Fax: (+853) 8822-2441



<https://ime.um.edu.mo>

<https://www.amsv.um.edu.mo>



澳門大學
UNIVERSIDADE DE MACAU
UNIVERSITY OF MACAU



模擬與混合信號超大規模集成電路
國家重點實驗室

Laboratório de Referência do Estado em
Circuitos Integrados em Muito Larga Escala
Análogos e Mistos
State Key Laboratory of
Analog and Mixed-Signal VLSI



微電子研究院

Instituto de Microelectrónica
Institute of Microelectronics

SCI Journals – 75 papers

IEEE Journal of Solid-State Circuits

- "A 1.7–3.6 GHz 20 MHz-Bandwidth Channel-Selection N-Path Passive-LNA Using a Switched-Capacitor-Transformer Network Achieving 23.5 dBm OB-IIP₃ and 3.4–4.8 dB NF", *IEEE Journal of Solid-State Circuits*, Vol. 57, No. 2, pp. 413-422, Feb 2022.
 - "A 0.0285-mm² 0.68-pJ/bit Single-Loop Full-Rate Bang-Bang CDR Without Reference and Separate FD Pulling Off an 8.2-Gb/s/μs Acquisition Speed of the PAM-4 Input in 28-nm CMOS", *IEEE Journal of Solid-State Circuits*, Vol. 57, No. 2, pp.546-561, Feb 2022.
 - "A 20 MHz Bandwidth 79 dB SNDR SAR-Assisted Noise-Shaping Pipeline ADC with Gain and Offset Calibrations", *IEEE Journal of Solid-State Circuits*, Vol.57, No. 3, pp. 745-756, Mar 2022.
 - "A 50-Gb/s PAM-4 Silicon-Photonic Transmitter Incorporating Lumped-Segment MZM, Distributed CMOS Driver, and Integrated CDR", *IEEE Journal of Solid-State Circuits*, Vol. 57, No. 3, pp.767-780, Mar 2022.
 - "An Inherent Gain Error Tolerance Noise-Shaping SAR-Assisted Pipeline ADC with Code-Counter-Based Offset Calibration", *IEEE Journal of Solid-State Circuits*, Vol. 57, no.5, pp. 1480-1491, May 2022.
 - "A Sub-0.25-pJ/bit 47.6-to-58.8-Gb/s Reference-Less FD-Less Single-Loop PAM-4 Bang-Bang CDR with a Deliberate-Current-Mismatch Frequency Acquisition Technique in 28-nm CMOS", *IEEE Journal of Solid-State Circuits*, Vol. 57, no.5, pp.1358-1371, May 2022.
 - "A Reconfigurable Single-Stage Asymmetrical Full-Wave Step-Down Rectifier for Bidirectional Device-to-Device Wireless Fast Charging", *IEEE Journal of Solid-State Circuits*, Vol. 57, No. 6, pp. 1888-1898, Jun 2022.
 - "A 13-Bit ENOB Third-Order Noise-Shaping SAR ADC Employing Hybrid Error Control Structure and LMS-Based Foreground Digital Calibration", *IEEE Journal of Solid-State Circuits*, Vol.57, No. 7, pp. 2181 - 2195, Jul 2022.
 - "Arithmetic Progression Switched-Capacitor DC-DC Converter Topology with Soft VCR Transitions and Quasi-Symmetric Two-Phase Charge Delivery", *IEEE Journal of Solid-State Circuits*, vol. 57, no. 10, pp. 2919-2933, Oct 2022.
 - "A 108-nW 0.8-mm² Analog Voice Activity Detector Featuring a Time-Domain CNN With Sparsity-Aware Computation and Sparsified Quantization in 28-nm CMOS", *IEEE Journal of Solid-State Circuits*, Vol.57, No. 11, pp. 3288 - 3297, Nov 2022.
 - "A Miniaturized 3-D-MRI Scanner Featuring an HV-SOI ASIC and Achieving a 10 × 8 × 8 mm³ Field of View", *IEEE Journal of Solid-State Circuits*, Early Access.
-
- "Analysis and Design of Three-Coil Coupler for Inductive Power Transfer System With Automatic Seamless CC-to-CV Charging Capability", *IEEE Access*, vol. 10, pp. 10139-10148, Jan 2022.
 - "Mismatch Analysis of DTCs with an Improved BIST-TDC in 28-nm CMOS", *IEEE Transactions on Circuits and Systems I: Regular Papers*, Vol.69, No.1, pp. 196-206, Jan 2022.
 - "A Single-Opamp Third Order CT ΔΣ Modulator With SAB-ELD-Merged Integrator and Three-Stage Hybrid Compensation Opamp" *IEEE Transactions on Circuits and Systems I: Regular Papers*, Vol.69, No. 1, pp.64-74, Jan 2022.
 - "A 529-μW Fractional-N All-Digital PLL Using TDC Gain Auto-Calibration and an Inverse-Class-F DCO in 65-nm CMOS", *IEEE Transactions on Circuits and Systems I: Regular Papers*, Vol. 69, No.1, pp. 51-63, Jan 2022.
 - "A Millimeter-Wave CMOS VCO Featuring a Mode-Ambiguity-Aware Multi-Resonant-RLCM Tank," *IEEE Transactions on Circuits and Systems I: Regular Papers*, Vol.69, No. 1, pp.172-185, Jan 2022.
 - "Switched-Capacitor Bandgap Voltage Reference for IoT Applications", *IEEE Transactions on Circuits and Systems I: Regular Papers*, Vol. 69, No. 1, pp. 16-29, Jan 2022.
 - "A 4T/Cell Amplifier-Chain-Based XOR PUF with Strong Machine Learning Attack Resilience" *IEEE Transactions on Circuits and Systems I: Regular Papers*, Vol. 69, No. 1, pp. 366-377, Jan 2022.
 - "Analysis, Design and Implementation of Multi-Quasi-Proportional-Resonant Controller for Thyristor-Controlled LC-Coupling Hybrid Active Power Filter (TCLC-HAPF)" *IEEE Transactions on Industrial Electronics*, Vol. 69, No. 1, pp. 29-40, Jan 2022.
 - "A 0.15-V, 44.73% PCE charge pump with CMOS differential ring-VCO for energy harvesting systems", *Analog Integrated Circuits and Signal Processing*, Vol. 111, No. 1, pp.35-43, Jan 2022.
 - "Comparative Study on Galvanic-Coupled Intrabody Channel Characteristic Measurement Methods", *Journal of Beijing Institute of Technology (English Edition)*, Vol. 31, No. 1, pp.30-38, Feb 2022.
 - "A Comparative Study of the Electrodes Gels' Electrical Properties in the Measurement Issues of Intrabody Communication", *Journal of Beijing Institute of Technology (English Edition)*, Vol. 31, No. 1, pp. 71-80, Feb 2022.
 - "A 3.3-GHz Integer N-Type-II Sub-Sampling PLL Using a BFSK-Suppressed Push-Pull SS-PD and a Fast-Locking FLL Achieving -82.2-dBc REF Spur and -255-dB FOM", *IEEE Transactions on Very Large Scale Integration (VLSI) Systems*, Vol. 30, No. 2, pp.238-242, Feb 2022.
 - "Accurate Performance Evaluation of Jitter-Power FOM for Multiplying Delay-Locked Loop", *IEEE Transactions on Circuits and Systems I: Regular Papers*, Vol. 69, no.2, pp.495-505, Feb 2022.
 - "A 10-MHz to 50-GHz low-jitter multiphase clock generator for high-speed oscilloscope in 0.15-μm GaAs technology", *International Journal of Circuit Theory and Applications*, Vol.50, No. 2, pp. 367-381, Feb 2022.
 - "One-shot high-resolution melting curve analysis for: KRAS point-mutation discrimination on a digital microfluidics platform", *Lab on a Chip*, Vol. 22, No.3, pp. 537-549, Feb 2022.
 - "A Swing-Enhanced Class-D VCO Using a Periodically Time-Varying (PTV) Inductor", *IEEE Solid-State Circuits Letters*, Vol. 5, pp. 25-28, Feb 2022.
 - "A 240 μ W 17 bit ENOB ΔΣ modulator using 2nd-order noise-shaped integrating quantizer," *IEICE Electronics Express*, Vol. 19, No. 5, Feb 2022.
 - "RF Rectifiers with Wide Incident Angle of Incoming Waves Based on Rat-Race Couplers", *IEEE Transactions on Microwave Theory and Techniques*, Vol. 70, no.3, pp.1983-1993, Mar 2022.
 - "A 56-Gb/s Reconfigurable Silicon-Photonics Transmitter Using High-Swing Distributed Driver and 2-Tap in-Segment Feed-Forward Equalizer in 65-nm CMOS", *IEEE Transactions on Circuits and Systems I: Regular Papers*, Vol. 69, No. 3, pp.1159-1170, Mar 2022.
 - "Predicting the Influence of Axon Myelination on Sound Localization Precision Using a Spiking Neural Network Model of Auditory Brainstem", *Frontiers in Neuroscience*, Vo.16, Mar 2022.
 - "Constant-Frequency and Noncommunication-Based Inductive Power Transfer Converter for Battery Charging.", *IEEE Journal of Emerging and Selected Topics in Power Electronics*, Vol. 10, No. 2, pp.2147-2162, Apr 2022.
 - "A Fusion Topology of Higher Efficiency and Lower Capacity Hybrid Parallel Multi-Converters for Power Quality Compensation.", *IEEE Transactions on Power Electronics*, Vol.37, No. 5, pp. 5957-5969, May 2022.
 - "A Simple Fabrication, Low Noise, Capacitive Tactile Sensor for Use in Inexpensive and Smart Healthcare Systems", *IEEE Sensors Journal*, Vol. 22, No. 9, pp. 9069-9077, May 2022.
 - "The Masking Impact of Intra-artifacts in EEG on Deep Learning-based Sleep Staging Systems: A Comparative Study", *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, Vol. 30, pp. 1452-1463, May 2022.
 - "Single-channel Selection for EEG-based Emotion Recognition Using Brain Rhythm Sequencing", *IEEE Journal of Biomedical and Health Informatics*, Vol. 26, no.6, pp. 2493 - 2503, Jun 2022.
 - "Miniaturized Energy Harvesting Systems Using Switched-Capacitor DC-DC Converters," *IEEE Transactions on Circuits and Systems II: Express Briefs*, Vol. 69, No. 6, pp. 2629-2634, Jun 2022.
 - "Background Timing Mismatch Calibration Techniques in High-Speed Time-Interleaved ADCs: A Tutorial Review", *IEEE Transactions on Circuits and Systems II: Express Briefs*, Vol. 69, No. 6, pp. 2564 - 2569, Jun 2022.
 - "A 23- to 28-GHz 5-bit switch-type phase shifter with 1-bit calibration based on optimized ABCD matrix design methods for 5G MIMO system in 0.15-μm GaAs", *International Journal of Circuit Theory and Applications*, Vol. 50, No. 6, pp. 1834-1854, Jun 2022.
 - "A switched-capacitor-assisted wireless power transfer system with regulating TX power and fast global loop", *Electronics Letters*, Vol. 58, No. 12, pp. 477-479, Jun 2022.
 - "A Fully-Integrated Ambient RF Energy Harvesting System with 423-μ W Output Power", *Sensors*, Vol. 22, No. 12, Jun 2022.
 - "A Variable-Volume Heart Model for Galvanic Coupling-Based Conductive Intracardiac Communication", *Sensors*, Vol. 22, No. 12, Jun 2022.
 - "Rapid image detection and recognition of rice false smut based on mobile smart devices with anti-light features from cloud database", *Biosystems Engineering*, Vol. 218, pp. 229-244, Jun 2022.

- "A Unified Knowledge Extraction Method Based on BERT and Handshaking Tagging Scheme", *Applied Sciences*, Vol. 12, No.13, Jun 2022.
- "Fully-Integrated Timers for Ultra-Low-Power Internet-of-Things Nodes—Fundamentals and Design Techniques", *IEEE Access*, Vol. 10, pp. 65936 - 65950, Jun 2022.
- "A 12-Bit 50 MS/s Split-CDAC-Based SAR ADC Integrating Input Programmable Gain Amplifier and Reference Voltage Buffer", *Electronics*, Vol.11, No.12, Jun 2022.
- "Automatic Detection Pipeline for Accessing the Motor Severity of Parkinson's Disease in Finger Tapping and Postural Stability," *IEEE Access*, Vol. 10, pp. 66961-66973, Jun 2022.
- "Trending IC design directions in 2022", *Journal of Semiconductors*, Vol. 43, No. 7, Jul 2022
- "A Multimode CMOS Vision Sensor With On-Chip Motion Direction Detection and Simultaneous Energy Harvesting Capabilities", *IEEE Sensors Journal*, Vol. 22, No. 12, pp. 12808 - 12819, Jul 2022.
- "High-Performance Harmonic-Rich Single-Core VCO with Multi-LC Tank: A Tutorial", *IEEE Transactions on Circuits and Systems II: Express Briefs*, Vol. 69, No.7, pp. 3115-3121, Jul 2022.
- "Improved Model Predictive Control with Signal Correction Technique of LC-Coupling Hybrid Active Power Filter", *IEEE Journal of Emerging and Selected Topics in Power Electronics*, Vol.10, No. 4, pp. 4650-4664, Aug 2022.
- "A Visible Human Data-Based Whole-Body Model for Investigating the Transmission Attenuation of Intrabody Communication", *IEEE Transactions on Microwave Theory and Techniques*, Vol. 70, no.8, pp. 3827 - 3837, Aug2022.
- "Miniaturization of a Nuclear Magnetic Resonance System: Architecture and Design Considerations of Transceiver Integrated Circuits", *IEEE Transactions on Circuits and Systems I: Regular Papers*, Vol. 69, No. 8, pp. 3049-3060, Aug 2022.
- "An Approach to Emotion Recognition Using Brain Rhythm Sequencing and Asymmetric Features," *Cognitive computation*, Vol. 14, No. 6, pp. 2260-2273, Aug 2022.
- "Channel Characteristics Analysis of Galvanic Coupling Intra-Body Communication", *IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology*, Vol. 6, No. 3, pp. 364-372, Sep 2022.
- "A Highly Integrated Tri-Path Hybrid Buck Converter with Reduced Inductor Current and Self-Balanced Flying Capacitor Voltage", *IEEE Transactions on Circuits and Systems I: Regular Papers*, Vol. 69, No. 9, pp. 3841 - 3850, Sep 2022.
- "A 0.1-V V_{th} Subthreshold 3-Stage Dual-Branch Charge Pump with 43.4% Peak Power Conversion Efficiency Using Advanced Dynamic Gate-Bias", *IEEE Transactions on Circuits and Systems II: Express Briefs*, Vol. 69, No. 9, pp. 3929 - 3933, Sep 2022.
- "In Situ K Doped γ -LiV₂O₅ as Long-Life Anode and Cathode for Lithium Ion Battery", *ACS Applied Energy Materials*, Vol.5, No.9, Sep 2022.
- "A Capacitor-Cross-Connected Boost Converter with Duty Cycle < 0.5 Control for Extended Conversion-Ratio and Soft Start-Up", *IEEE Transactions on Circuits and Systems I: Regular Papers*, Vol.69, No.10, pp. 4272 - 4283, Oct 2022.
- "An FPGA Based Self-Reconfigurable Arc Fault Detection System for Smart Meters", *IEEE Transactions on Circuits and Systems II: Express Briefs*, Vol. 69, No.10, pp. 4133 - 4137, Oct 2022.
- "An Analog Multiplier Controlled Buck-Boost Converter", *IEEE Transactions on Circuits and Systems II: Express Briefs*, Vol.69, No.10, pp.4173 – 4177, Oct 2022.
- "An FPGA-Based Energy-Efficient Reconfigurable Depthwise Separable Convolution Accelerator for Image Recognition", *IEEE Transactions on Circuits and Systems II: Express Briefs*, Vol. 69, No.10, pp. 4003 - 4007, Oct 2022.
- "Double-Sided Sapphire Optrodes with Conductive Shielding Layers to Reduce Optogenetic Stimulation Artifacts", *Micromachines*, Vol. 13, 1836, Oct 2022.
- "A 1.2-A Calibration-Free Hybrid LDO with In-Loop Quantization and Auxiliary Constant Current Control Achieving High Accuracy and Fast DVS", *IEEE Transactions on Circuits and Systems I: Regular Papers*, Vol. 69, No. 11, pp. 4443 - 4452, Nov 2022.
- "A -40~125°C 0.4 μ A Low Noise Bandgap Voltage Reference with 0.8mA Load Driving Capability Using Shared Feedback Resistors", *IEEE Transactions on Circuits and Systems II-Express Briefs*, Vol. 69, No. 10, pp. 4033 - 4037, Oct 2022.
- "Real-time and Cost-effective Smart Mat System based on Frequency Channel Selection for Sleep Posture Recognition in IoMT", *IEEE Internet of Things Journal*, Vol. 9, No. 21, Nov 2022.
- "Detection of airborne pathogens with single photon counting and real-time spectrometer on microfluidics", *Lab on a Chip*, 22, 4995-5007, Nov 2022.
- "Automatic power-stage partitioning method for reconfigurable SC DC-DC converters with reduced power-cell redundancy," *IET Electronics Letters*, Vol. 58, Issue 25, pp. 957-962, Dec. 2022.
- "Line-transient enhancement techniques for multi-path hybrid DC-DC converter with <1% output overshoot/undershoot," *IET Electronics Letters*, Vol. 58, Issue 25, pp. 952-956, Dec. 2022.
- "A Symmetrical Double Step-Down Converter with Extended Voltage Conversion Ratio", *IEEE Transactions on Circuits and Systems I: Regular Papers*, Vol. 69, No. 12, pp. 4761-4773, Dec. 2022
- "An FPGA-Based Transformer Accelerator Using Output Block Stationary Dataflow for Object Recognition Applications", *IEEE Transactions on Circuits and Systems II: Express Briefs*, vol. 70, no. 1, pp. 281-285, Jan 2023.
- "A Residential Miniboost Photovoltaic Inverter with Maximum Power Point Operation and Power Quality Compensation," *IEEE Transactions on Industrial Electronics*, vol. 70, no. 5, pp. 4320-4331, May 2023.
- "Observer based Second-Order Sliding Mode Current Controller for Thyristor-Controlled LC-Coupling Hybrid Active Power Filter", *IEEE Journal of Emerging and Selected Topics in Power Electronics*, Early Access.
- "Emotion Recognition Based on EEG Brain Rhythm Sequencing Technique", *IEEE Transactions on Cognitive and Developmental Systems*, Early Access, 2022

Major IEEE Solid-State Circuit Conferences

IEEE International Solid-State Circuits Conference (ISSCC)

- Haijun Shao; Pui-In Mak; Gengzhen Qi; Rui P. Martins, "A 266 μ W Bluetooth Low-Energy (BLE) Receiver Featuring an N-Path Passive Balun-LNA and a Pipeline Down-Mixing BB-Extraction Scheme Achieving 77dB SFDR and -3dBm OOB-B-1dB", Feb 2022.
- Tingxu Hu; Mo Huang; Yan Lu; Rui P. Martins, "A 4A 12-to-1 Flying Capacitor Cross-Connected DC-DC Converter with Inserted D>0.5 Control Achieving 2x Transient Inductor Current Slew Rate and 0.73 \times Theoretical Minimum Output Undershoot of DSD", Feb 2022.
- Guigang Cai; Yan Lu; Rui Martins, "A Battery-Input Sub-1V Output 92.9% Peak Efficiency 0.3 A/mm² Current Density Hybrid SC-Parallel-Inductor Buck Converter with Reduced Inductor Current in 65nm CMOS", Feb 2022.
- Feifei Chen; Ka-Fai Un; Wei-Han Yu; Pui-In Mak; Rui P. Martins, "A 108nW 0.8mm² Analog Voice Activity Detector (VAD) Featuring a Time-Domain CNN as a Programmable Feature Extractor and a Sparsity-Aware Computational Scheme in 28nm CMOS", Feb 2022.
- Bo Wang; Man Kay Law; Amine Bermak, "A BJT-Based CMOS Temperature Sensor Achieving an Inaccuracy of pm 0.45C(3) from * 50° C to 180° C and a Resolution-FoM of 7.2pJ.K² at 150° C ", Feb 2022.

IEEE Custom Integrated Circuits Conference (CICC)

- Mingqiang Guo; Sai-Weng Sin; Liang Qi; Gangjun Xiao; Rui P. Martins, "A 10b 700MS/s single-channel 1b/cycle SAR ADC using a monotonic-specific feedback SAR logic with power-delay-optimized unbalanced N/P-MOS sizing", Apr 2022.
- Zixiao Lin; Yan Lu; Fangyu Mao; Chuang Wang; Rui P. Martins, "All Rivers Flow to the Sea: A High Power Density Wireless Power Receiver with Split-Dual-Path Rectification and Hybrid-Quad-Path Step-Down Conversion", Apr 2022.

IEEE Asian Solid-State Circuit Conference (A-SSCC)

- Liwen Li; Ka-Meng Lei; Pui-In Mak; Rui Martins, "A sub-0.5V Crystal Oscillator-Timer (XO-Timer) Combining 16MHz Reference and 32kHz Sleep Timer with a Single Crystal for Energy-Harvesting Radios in 28nm CMOS", Nov 2022.

IEEE European Solid-State Circuits Conference (ESSCIRC)

- Daniel Krüger; Aoyang Zhang; Henry Hinton; Victor M. Amal; Yi-Qiao Song; Yiqiao Tang; Ka-Meng Lei; Jens Anders; Donhee Ham, "A Portable CMOS-based MRI System with 67 \times 67 \times 83 μ m³ Image Resolution", Sep 2022.

IEEE Radio-Frequency Integrated Circuits Symposium (RFIC)

- Wen Chen; Yiyang Shu; Huizhen Jenny Qian; Jun Yin; Pui-In Mak; Xiang Gao; Xun Luo, "A 21.8–41.6GHz Fast-Locking Sub-Sampling PLL with Dead Zone Automatic Controller Achieving 62.7-fs Jitter and –250.3dB FoM", pp 159-162, Jun 2022.