Wei Jiang

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RESEARCH INTERESTS

- **Microelectronics and optical sensing circuits for emerging applications**
  - ✓ Low-cost and high-sensitivity optical sensors
  - ✓ High-performance and high-speed readout integrated circuits
  - ✓ High-impact applications of optical sensors and microelectronics

EDUCATION

- **Doctor of Philosophy, Biomedical Engineering** **09/2017 – 09/2021**
  McMaster University, Hamilton, Canada
  Thesis: CMOS Single-Photon Avalanche Diodes Towards Positron Emission Tomography Imaging Applications
  Supervisor: Dr. M. Jamal Deen
- **Master of Applied Science, Electrical and Electronic Engineering** **09/2006 – 01/2009**
  Shanghai Jiao Tong University, Shanghai, China
  Thesis: Analysis and Design of the CMOS Mixer in a GPS Receiver
  Supervisor: Dr. Jianjun Zhou
- **Bachelor of Engineering, Electrical and Electronic Engineering** **09/2002 – 06/2006**
  Xi'an Jiao Tong University, Xi'an, China

EMPOLYMENT

- **Assistant Professor** **03/2024 – Present**
  Hong Kong University of Science and Technology (Guang zhou), Guang zhou, China
- **Senior / Staff Engineer, Analog & Mixed-Signal Design** **08/2022 – 03/2024**
  Synopsys Inc., Mississauga, Canada
- **Mitacs Elevate Postdoctoral Fellow / Sessional Instructor** **09/2021 – 08/2022**
  Department of Electrical & Computer Engineering, McMaster University, Hamilton, Canada
- **Research Assistant and Teaching Assistant** **09/2017 – 08/2021**
  School of Biomedical Engineering, McMaster University, Hamilton, Canada
- **Lead Electronics Engineer** **01/2016 – 04/2017**
  R&D Center, Smiths Medical (now part of ICU medical), Shanghai, China
- **Senior Electronics Design Engineer** **08/2013 – 01/2016**
  Innovation and R&D Center, Carl Zeiss, Shanghai, China
- **Electronics Engineer / Senior Electronics Engineer** **04/2009 – 07/2013**
  Shanghai Center for Biomedical Engineering, Chinese Academy of Sciences, Shanghai, China

PROFESSIONAL EXPERIENCE

Assistant Professor **03/2024 – Present**

HKUST(GZ), Guang zhou, China

- ✓ Teaching and research in the Thrust of Microelectronics

Adjunct Assistant Professor **02/2023 – 06/2027**

Department of Electrical & Computer Engineering, McMaster University, Hamilton, Ontario, Canada

- ✓ Assist in mentoring Master and Ph.D. Students in Micro- and Nano-Systems Laboratory.
- ✓ Provide consultancy in research projects related to optical sensors, integrated circuits and their emerging applications.

Senior / Staff Engineer, Analog & Mixed-Signal Design **08/2022 – 03/2024**

Synopsys, Mississauga, Ontario, Canada

- ✓ Designed and verified the custom analog & mixed-signal circuits for high-performance PLLs (Phase-Locked Loops) in advanced FinFET (Fin Field-effect Transistor) processes.
- ✓ Developed and simulated the top-level model for PLLs.

Mitacs Elevate Postdoctoral Fellow / Sessional Instructor **09/2021 – 08/2022**

Department of Electrical & Computer Engineering, McMaster University, Hamilton, Ontario, Canada

Research topic: Optical Sensors and Wearable Sensing Systems for Healthcare Applications

- ✓ Designed and optimized the optical sensors and associated integrated circuits for the medical imaging applications using standard CMOS technologies.
- ✓ Developed a low-cost wearable tele-health monitoring system for chronic and infectious diseases and transferred the hardware prototype to the industrial collaborator.

Sessional Instructor for the Courses CE 4EK4 & ECE 6EK4 - Microelectronics

- ✓ Set up the course outline, made the schedule for the teaching activities, and took charge of the lectures, tutorials, lab assignments, term projects, exams; Supervised and guided the Teaching Assistant to manage the lab sections.
- ✓ The average of the student teaching evaluation score is 8.5 out of 10 (in the top third of the instructors in the department).

Graduate Research Assistant **09/2017 – 08/2021**

School of Biomedical Engineering, McMaster University, Hamilton, Ontario, Canada

Research topic: The design of optical sensors and integrated circuits for biomedical imaging applications

- ✓ Designed different structures of single-photon avalanche diodes (SPADs) using standard CMOS technologies with a focus on the noise optimization and reduction, aiming for biomedical imaging applications.
- ✓ Implemented three novel frontend integrated circuits for SPADs: differential quench and reset (QR) circuits, active QR circuits, and time-gated circuits to enhance the performance of SPADs in standard silicon-based processes.
- ✓ Characterized and measured the SPADs and associated circuits to obtain the performance parameters using different measurement equipment and summarized the research findings for patents and publications.

Research topic: Wearable sensing system for healthcare applications

- ✓ Proposed a wearable tele-health patient monitoring system to monitor physiological parameters for chronic and infectious diseases.
- ✓ Built the prototype that contains 5 types of sensors used in the system: temperature sensor, electrocardiography (ECG) and photoplethysmography (PPG) sensor, microphone, and accelerometer.
- ✓ Developed and validated the algorithms to calculate the physiological parameters using the sensing data and summarized the research findings for patents and publications.

Lead Electronics Engineer **01/2016 – 04/2017**

R&D Center, Smiths Medical (now part of ICU medical), Shanghai, China

Project: Clinical Infusion Pump systems - Graseby 1200

- ✓ Developed the driver circuit board to control the operation of the Infusion Pump.
- ✓ Participated in the prototype integration, measurement, verification, mass production transfer.
- ✓ Launched the Infusion Pump into the commercial market successfully.

Senior Electronics Design Engineer **08/2013 – 01/2016**

Innovation and R&D Center, Carl Zeiss, Shanghai, China

Project: OCT (Optical Coherent Tomography) imaging system - Primus 200

- ✓ Designed the schematic and layout for APD (Avalanche Photo Diode) board to obtain fundus image.
- ✓ Tested and verified the APD board and integrated this module into the system; revised and tested the optical safety circuit board to avoid optical hazard; Engaged in Risk Analysis, OCT system integration and verification.
- ✓ Transferred the prototype into mass production and launched OCT device into the commercial market successfully.

Electronics Engineer / Senior Electronics Engineer **04/2009 – 07/2013**

Shanghai Center for Biomedical Engineering, Chinese Academy of Sciences, Shanghai, China

Project: PET (Positron Emission Tomography) Imaging System – Rainbow VHD

- ✓ Developed and tested a new position algorithm for PET detector and implemented the algorithm in field programmable gate array (FPGA) and conducted the design of the detector testing platform and analyzed the performance of the PET detector.
- ✓ Designed the front-end circuits to process the analog signals from the PET detectors.

- ✓ Integrated the PET detectors and the front-end circuits into the medical imaging system and engaged in testing, debugging and performance evaluation experiments for the whole system.

TEACHING EXPERIENCE

Assistant Professor **09/2024 – Present**

Microelectronics Thrust, HKUST(GZ), Guangzhou, China

Courses: MICS 6001E - Sensors and Circuits for Biomedical Applications (2024 Fall)

MICS 6001N - Fundamentals and Design Practice of CMOS Integrated Circuits (2025 Spring)

Teaching Trainee (Certificate) **05/2022 – 06/2022**

MacPherson Institute, McMaster University, Hamilton, Canada

Course: EDUCATION 650 - Peer Evaluated Teaching Experience

Sessional Instructor **09/2021 – 12/2021**

Department of Electrical & Computer Engineering, McMaster University, Hamilton, Canada

Courses: CE 4EK4 & ECE 6EK4 - Microelectronics (2021 Fall)

Teaching Assistant **01/2018 – 04/2021**

Department of Electrical & Computer Engineering, McMaster University, Hamilton, Canada

Courses: EE 2CJ4 - Circuits and Systems (2018 Winter)

CE 4EK4 & ECE 6EK4 - Microelectronics (2019 Fall, 2020 Fall)

EE 3TR4 - Communication Systems (2021 Winter)

MENTORING AND SUPERVISION EXPERIENCE

Graduate students at HKUST(GZ)

- Jiayuan Li (Ph.D., Sept. 2025 –)
- Ziliang Yin (Ph.D., Sept. 2025 –)
- Yongkang Zhang (Ph.D., Sept. 2025 –)
- Xuanyu Qian (Ph.D., Sept. 2024 –)
- Zecheng Gao (Ph.D., Sept. 2024 –)
- Yulin Xin (MASc., Sept. 2025 –)
- Haolin Zhao (MASc., Sept. 2025 –)
- Yiyan Hu (MASc., Sept. 2025 –)
- Junju Huang (MASc., Sept. 2024 –)
- Chang Liu (MASc., Sept. 2024 –)
- Yinglong Zhu (MASc., Sept. 2024 –)

Graduate students at McMaster:

- Leo Liu (MASc., Sept. 2021– Dec. 2024)
- Xuanyu Qian (MASc., Sept. 2021– Sept. 2023)
- Yamn Chalich (MASc., Dec. 2017–April 2019)
- Junzhi Liu (MASc., Sept. 2021 – Oct. 2023)
- Ryan Scott (MASc., Dec. 2019 –Aug. 2021)

Undergraduate students at McMaster:

- Andrew Ye (Research Intern, May – August 2022)
- Shiyi Yang (Research Intern, May – August 2022)
- Vivek Patel (Research Intern, May – August 2021)
- Manvir Bhang (Research Intern, May – August 2022)
- Leo Liu (Research Intern, May – August 2021)
- Samarth Kumar (Research Intern, May – August 2020)

JOURNALS

Published:

J1. Z. Sastimoglu, S. Subramaniam, A. I. Faisal, W. Jiang, A. Ye, M. J. Deen, "Wearable PPG based BP estimation methods: A systematic review and meta-analysis," ***IEEE Journal of Biomedical and Health Informatics***, vol. 29, no. 4, pp. 2439 - 2452, Nov. 2024, doi: 10.1109/JBHI.2024.3499834

J2. S. Majumder, A. K. Roy, W. Jiang, T. Mondal, M. J. Deen, "Smart Textiles to Enable In-Home Health Care: State of the Art, Challenges, and Future Perspectives," ***IEEE Journal on Flexible Electronics,*** vol. 3, no. 4, pp.120-150, Dec. 2023, doi: 10.1109/JFLEX.2023.3339587

J3. **Invited Paper**, X. Qian, W. Jiang and M. J. Deen, "Single Photon Detectors for LiDAR Applications: State-of-the-Art and Research Challenges," ***IEEE Journal of Selected Topics in Quantum Electronics,*** pp. 1–14, 2023, doi: 10.1109/JSTQE.2023.3304294.

J4. J. Liu, W. Jiang, and M. J. Deen, "Time-Controlled SPAD Receivers in Optical Wireless Communication System," ***IEEE Photonics Journal***, 2023, doi: 10.1109/JPHOT.2023.3309881.

J5. **Invited Paper**, X. Qian, W. Jiang, A. Elsharabasy and M. J. Deen, "Modeling for Single-Photon Avalanche Diodes: State-of-the-Art and Research Challenges," ***Sensors***, vol. 23, no. 7, p. 3412, Mar. 2023, doi: 10.3390/S23073412.

J6. F. Ye[#], S. Majumder[#], W. Jiang[#], X. Li, N. Balakrishnan, Y. Zhang, and M. J. Deen, "A Framework for Infectious Disease Monitoring with Automated Contact Tracing – A Case Study of COVID-19," ***IEEE Internet of Things Journal***, 22 pages, on-line, 22 August 2022, doi: 10.1109/JIOT.2022.3199216. ([#]equal contribution)

J7. R. Scott, W. Jiang, X. Qian and M.J. Deen, "*A Multi-Time-Gated SPAD Array with Integrated Coarse TDCs*," ***Electronics***, vol. 11(13), June 2022, doi:10.3390/electronics11132015.

J8. W. Jiang, R. Scott, and M. J. Deen, "Improved Noise Performance of CMOS Poly Gate Single-Photon Avalanche Diodes," ***IEEE Photonics Journal***, vol. 14, no. 1, Feb. 2022, doi: 10.1109/JPHOT.2021.3128055.

J9. W. Jiang, R. Scott, and M. J. Deen, "High-Speed Active Quench and Reset Circuit for SPAD in a Standard 65 nm CMOS Technology," ***IEEE Photonics Technology Letters***, vol. 33, no. 24, pp. 1431–1434, Dec. 2021, doi: 10.1109/LPT.2021.3124989.

J10. R. Scott, W. Jiang, and M. J. Deen, "CMOS Time-to-Digital Converters for Biomedical Imaging Applications," ***IEEE Reviews in Biomedical Engineering***, 26 pages, on-line, 24 June 2021, doi: 10.1109/RBME.2021.3092197.

J11. W. Jiang, R. Scott, and M. J. Deen, "Differential Quench and Reset Circuit for Single-Photon Avalanche Diodes," ***IEEE/OSA Journal of Lightwave Technology***, vol. 39, no. 22, pp. 7334–7342, 2021, doi: 10.1109/JLT.2021.3111119.

J12. W. Jiang[#], S. Majumder[#], S. Kumar, S. Subramaniam, X. Li, R. Khedri, T. Mondal, M. Abolghasemian, I. Satia, and M. J. Deen, "A Wearable Tele-Health System towards Monitoring COVID-19 and Chronic Diseases," ***IEEE Reviews in Biomedical Engineering***, vol. 15, pp. 61– 84, 2021, doi: 10.1109/RBME.2021.3069815. ([#]equal contribution)

J13. W. Jiang and M. J. Deen, "Random Telegraph Signal in n^+/p-Well CMOS Single-Photon Avalanche Diodes," ***IEEE Transactions on Electron Devices***, vol. 68, no. 6, pp. 2764 –2769, 2021, doi: 10.1109/TED.2021.3070557.

J14. W. Jiang, Y. Chalich, R. Scott, and M. J. Deen, "Time-Gated and Multi-Junction SPADs in Standard 65 nm CMOS Technology," ***IEEE Sensors Journal***, vol. 21, no. 10, pp. 12092 –12103, 2021, doi: 10.1109/JSEN.2021.3063319.

J15. **Invited Paper**, W. Jiang, Y. Chalich, M. J. Deen, Sensors for Positron Emission Tomography Applications, ***Sensors***, vol. 19, no. 22, 56 pages, Nov. 2019, doi: 10.3390/s19225019.

CONFERENCES AND WORKSHOPS

Published:

C1. X. Qian, W. Jiang*, M. J. Deen, "A 2-D Noise Model for CMOS Single Photon Avalanche Diodes," ***2025 IEEE Electron Devices Technology and Manufacturing Conf.***, pp.1-3, Hong Kong, Mar. 2025, doi: 10.1109/EDTM61175.2025.11040184

C2. W. Jiang and M. J. Deen, "Temperature-compensated Biasing for Single-photon Avalanche Diode Sensors," ***2022 IEEE Photonics Conf.***, pp. 1–2, Vancouver, Canada, Nov. 2022, doi: 10.1109/IPC53466.2022.9975766.

C3. J. Liu, W. Jiang, and M. J. Deen, "Time-Gated Circuits for SPAD-based optical wireless communication," ***2022 IEEE Photonics Conf.***, pp. 1–2, Vancouver, Canada, Nov. 2022, doi: 10.1109/IPC53466.2022.9975721.

C4. **Invited Paper**, M.J. Deen and W. Jiang, "Noise Issues of SPADs in Standard Silicon-based Technologies," ***ISSW 2022 - The International SPAD Sensor Workshop***, Graz, Austria (13-15 June 2022).

C5. **Best Presentation Award**, X. Qian, W. Jiang, and M.J. Deen, "Enhanced Photon Detection Probability Model for in TCAD With Machine Learning," ***2022 IEEE Int. IOT, Electron. Mechatronics Conf. IEMTRONICS 2022***, Toronto, Canada, June 2022, doi: 10.1109/IEMTRONICS55184.2022.9795802.

PATENT

P1. W. Jiang and M. J. Deen, "Differential quench and reset circuits for avalanche photodiodes." (Provisional application)

P2. S. Majumder, W. Jiang, R. Khedri, T. Mondal, I. Satia, and M. J. Deen, "A wearable tele-health monitoring system," (Provisional application)

P3. W. Jiang *et al.,* "A Detecting Device for Positron Emission Tomography Imaging System", **Patent Number** CN201775635U (30 March 2011, as the first inventor)

PROFESSIONAL ACTIVITIES

Reviewer:

- ✓ **Journals:**
  - ✧ *IEEE Electron Device Letters*
  - ✧ *IEEE Transactions on Electron Devices*
  - ✧ *IEEE Sensors Letters*
  - ✧ *IEEE Internet of Things Journal*
  - ✧ *IEEE Transactions on Communications*
  - ✧ *IEEE Transactions on Biomedical Circuits and Systems*
  - ✧ *IEEE Sensors Journal*
  - ✧ *IEEE Journal of Biomedical and Health Informatics*
  - ✧ *IEEE Journal of the Electron Devices Society*

- ✧ *IEEE Transactions on Circuits and Systems II: Express Briefs*
- ✧ *Signa Vitae*
- ✧ *Optical Express*
- ✧ *Optics Letters*
- ✧ *Scientific Report*
- ✧ *Sensors and Actuators: A. Physical*
- ✧ *Journal of Digital Health*
- ✧ *JMIR mHealth and uHealth*
- ✧ *MDPI Sensors, Process, Electronics, Information, Photonics*

✓ **Conference:** *IEEE ICECET* 2022, 2024; *ECCE* 2023; *ICECCME 2023; IEEE BECITHCON 2024; IEEE Sensors Conf. 2023, 2024, 2025; IEEE ISCAS 2025, 2026.*

Senior Member, IEEE