



## Shirin Pourashraf

Physical Science Research Scientist, Rad/Molecular Imaging Program at Stanford

### SUPERVISORS

- Craig Levin

### Bio

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#### BIO

Shirin Pourashraf was born in Darreh Shahr (دره شهر), Ilam, Iran, in October 1984.

She started her graduate studies with research interests expanded to microelectronics, and very large scale integration (VLSI) design. She worked with Professor Sayed Masoud Sayedi at Isfahan University of Technology (IUT), Iran, and Professor Jaime Ramirez-Angulo at New Mexico State University, USA, respectively for her Masters, and Ph.D., focusing on integrated Circuit (IC) design. She designed, fabricated, experimentally tested, and validated the performance of several innovative digital, analog, and mixed-signal building block ICs mainly in 180 nm CMOS Technology. After her Ph.D., she joined Molecular Imaging and Instrumentations Laboratory (MIIL) at Stanford where she is currently a "Physical Science Research Scientist" working under the supervision of Professor Craig Levin, an expert in positron emission tomography (PET).

In MIIL, Shirin Pourashraf has been leading a challenging Medical Imaging hardware project to build a 16-module partial-ring Time of Flight (TOF)-PET Scanner with 100 ps coincidence time resolution (CTR), specifically by designing compact high-speed and low-noise/jitter custom electronic readouts. Upon completion scaling up the system, ~100 ps CTR results in >5-fold signal-to-noise-ratio (SNR) improvement in PET scanner, increasing its ability to detect and quantify metastatic malignant lesions (cancer/tumor) or alternatively, can substantially reduce scanning times or injected activity of/to the patient.

#### CURRENT ROLE AT STANFORD

Staff - Physical Science Research Scientist, Academic Staff at Rad/Molecular Imaging Program at Stanford

#### HONORS AND AWARDS

- 2024 IEEE NSS/MIC/RTSD Trainee Grant, Tampa, Florida, USA, 2024 IEEE Nuclear Science, Medical Imaging and Room Temperature Semiconductor Detector Conference (2024 July)
- 2024 Stanford Bio-X Travel Award, Bio-X at Stanford University (2024)
- 2023 IEEE NSS/MIC/RTSD Trainee Grant, Vancouver, Canada, IEEE Nuclear Science Symposium & Medical Imaging Conference (2023 July)
- 2023 Stanford Bio-X Travel Award, Bio-X at Stanford University (2023 August)
- 2022 Valentin T. Jordanov Radiation Instrumentation Travel Grant, 2022 IEEE Nuclear Science, Medical Imaging and Room Temperature Semiconductor Detector Conference (2022 September)
- 2022 IEEE NSS/MIC/RTSD Trainee Grant, Milano, Italy, IEEE 29th Nuclear Science Symposium & Medical Imaging Conference (2022 July)
- Stanford Cancer Imaging Training (SCIT) Fellowship; NIH T32 Award, NIH (National Institute of Health): National Cancer Institute (2022 Feb. to 2024 Feb.)
- 2022 Stanford Bio-X Travel Award, Bio-X at Stanford University (2022 August)

- 2021 IEEE NSS/MIC/RTSD Trainee Grant, Japan, IEEE 28th Nuclear Science Symposium & Medical Imaging Conference (2021)
- 2020 IEEE NSS/MIC/RTSD Trainee Grant, Boston, Massachusetts, United States., IEEE 27th Nuclear Science Symposium & Medical Imaging Conference (2020)
- Research grant; 1R01EB02512501, NIH (National Institution of Health) (2019-2024)
- Research grant; 5R01CA21466903, NIH (National Institution of Health) (2019-2024)
- 2019 IEEE NSS/MIC/RTSD Trainee Grant, Manchester, United Kingdom., IEEE Nuclear Science Symposium & Medical Imaging Conference (2019)
- Granted Xilinx Kintex-7 KC705 FPGA Evaluation Kit and associated licenses., Xilinx University Donation Program (2019)
- 2018 Outstanding Graduate Assistantship Award, Graduate School, New Mexico State University (2018)
- 2017 Outstanding Teaching Assistant Award, Klipsch School of Electrical and Computer Engineering Department, New Mexico State University (2017)
- 2002 Talented Students Association Award, Shahid Chamran University of Ahvaz (2002)

## EDUCATION AND CERTIFICATIONS

- Ph.D., New Mexico State University, NM, USA , Electrical Engineering/Mixed-Signal Integrated Circuit (IC) Design (2018)
- Master of Science, Isfahan University Of Technology (IUT) , Electrical Engineering/Microelectronics (2011)
- Bachelor of Science, Shahid Chamran University of Ahvaz , Electrical Engineering (2007)

## PATENTS

- Shirin Pourashraf, Joshua W. Cates, and Craig S. Levin. "United States Patent WO2024102854A2 Electronic Timing Channel Readout with Multiplexing Capabilities Cross-Reference to Related Applications", Stanford University, <https://patents.google.com/patent/WO2024102854A2/fr>, May 16, 2024

## LINKS

- Molecular Imaging Instrumentation Laboratory: <http://med.stanford.edu/miil.html>
- Stanford Cancer Imaging Training (SCIT) Program: <https://med.stanford.edu/scitprogram/trainees.html>
- LinkedIn: <https://www.linkedin.com/in/shirin-pourashraf-802a1750/>
- Google Scholar: [https://scholar.google.com/citations?hl=en&user=p9rILLAAAAAJ&view\\_op=list\\_works&sortby=pubdate](https://scholar.google.com/citations?hl=en&user=p9rILLAAAAAJ&view_op=list_works&sortby=pubdate)
- ResearchGate: [https://www.researchgate.net/profile/Shirin\\_Pourasharf/research](https://www.researchgate.net/profile/Shirin_Pourasharf/research)
- Google+: <https://plus.google.com/u/0/109040264139130097165?tab=iX>
- ORCID: <https://orcid.org/0000-0002-1852-6989>
- X: <https://x.com/spourashraf?lang=en>

## Professional

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### WORK EXPERIENCE

- Staff - Physical Science Research Scientist - Stanford University, School of Medicine (8/26/2024 - present)

## Publications

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### PUBLICATIONS

- **Self-thresholding, 48:2 multiplexed readout circuit for a 3D position sensitive, 100 ps CTR TOF-PET detector.** *Physics in medicine and biology*  
Pourashraf, S., Cates, J. W., Innes, D. R., Shah, Y. B., Levin, C. S.  
2025
- **A magnetic field compatible readout circuit for enhanced coincidence time resolution in BGO Cherenkov radiation-based TOF-PET detectors.** *Medical physics*  
Pourashraf, S., Cates, J. W., Levin, C. S.

2025

- **A Scalable Dynamic TOT Circuit for a 100 ps TOF-PET Detector Design to Improve Energy Linearity and Dynamic Range** *IEEE TRANSACTIONS ON RADIATION AND PLASMA MEDICAL SCIENCES*  
Pourashraf, S., Cates, J. W., Levin, C. S.  
2024; 8 (3): 237-247
- **Front-End Electronics for a 100 ps Coincidence Time Resolution TOF-PET Detector with 24-fold LVDS Timing Channel Multiplexing** *IEEE Transactions on Instrumentation and Measurement*  
Pourashraf, S., Cates, J. W., Innes, D., Levin, C. S.  
2024
- **< 2mm Continuous DOI Positioning in Arrays of Side-Coupled Crystals for a Highly Compact 100 ps FWHM CTR TOF-PET Detector Design** *2024 IEEE Nuclear Science Symposium (NSS), Medical Imaging Conference (MIC) and Room Temperature Semiconductor Detector Conference (RTSD)*  
Pourashraf, S., Cates, J. W., Innes, D., Ullah, M. N., Levin, C. S.  
2024
- **Highly Compact and Scalable 100 ps CTR 3D Positioning TOF-PET Detector Sub-Unit** *2023 IEEE Nuclear Science Symposium, Medical Imaging Conference and International Symposium on Room-Temperature Semiconductor Detectors (NSS MIC RTSD)*  
Pourashraf, S., Innes, D., Cates, J., Levin, C.  
2023
- **Cherenkov Radiation-Based Coincidence Time Resolution Measurements in BGO Scintillators** *FRONTIERS IN PHYSICS*  
Gonzalez-Montoro, A., Pourashraf, S., Cates, J. W., Levin, C. S.  
2022; 10
- **Investigation of Electronic Signal Processing Chains for a Prototype TOF-PET System with 100 ps Coincidence Time Resolution** *IEEE Transactions on Radiation and Plasma Medical Sciences*  
Pourashraf, S., Gonzalez-Montoro, A., Lee, M., Cates, J. W., Won, J. Y., Lee, J. S., Levin, C. S.  
2022; 6 (6): 690 - 696
- **Study of optical reflectors for a 100ps coincidence time resolution TOF-PET detector design.** *Biomedical physics & engineering express*  
Gonzalez-Montoro, A., Pourashraf, S., Lee, M. S., Cates, J. W., Levin, C. S.  
2021
- **Evolution of PET Detectors and Event Positioning Algorithms Using Monolithic Scintillation Crystals** *IEEE TRANSACTIONS ON RADIATION AND PLASMA MEDICAL SCIENCES*  
Gonzalez-Montoro, A., Gonzalez, A. J., Pourashraf, S., Miyaoka, R. S., Bruyndonckx, P., Chinn, G., Pierce, L. A., Levin, C. S.  
2021; 5 (3): 282-305
- **Scalable electronic readout design for a 100 ps coincidence time resolution TOF-PET system.** *Physics in medicine and biology*  
Pourashraf, S. n., Gonzalez-Montoro, A. n., Won, J. Y., Lee, M. S., Cates, J. W., Zhao, Z. n., Lee, J. S., Levin, C. S.  
2021
- **Studies of a Scalable Electronic Readout Design for a 100 ps Coincidence Time Resolution TOF-PET System**  
Pourashraf, S., Won, J. Y., Gonzalez-Montoro, A., Lee, M., Cates, J. W., Zhao, Z., Lee, J. S., Levin, C. S.  
IEEE Nuclear Science Symposium & Medical Imaging Conference (IEEE NSS-MIC), Boston, Massachusetts, United States.2020
- **Study of Optical Reflectors Used in Scintillation Detectors that Achieve 100 ps Coincidence Time Resolution for TOF-PET**  
Gonzalez-Montoro, A., Pourashraf, S., Lee, M., Cates, J. W., Levin, C. S.  
IEEE Nuclear Science Symposium & Medical Imaging Conference (IEEE NSS-MIC).2020
- **Investigation of Analog and Digital Signal Processing Chains for a Prototype TOF-PET System with 100 ps Coincidence Time Resolution**  
Pourashraf, S., Gonzalez-Montoro, A., Lee, M., Cates, J. W., Won, J. Y., Zhao, Z., Lee, J. S., Levin, C. S.  
IEEE Nuclear Science Symposium & Medical Imaging Conference (IEEE NSS-MIC).2020
- **Gain and Bandwidth Enhanced Class-AB OTAs**  
Pourashraf, S., Ramirez-Angulo, J., Roman-Loera, A., Gangineni, M., IEEE  
IEEE.2019: 778–81

- **Pulse Shape Discrimination and Energy Measurement in Phoswich Detectors Using Gated-Integrator Circuit**  
Pourashraf, S., Cates, J. W., Lee, M., Levin, C. S., IEEE  
IEEE.2019
- **$\pm 0.25$  V Low-voltage Class-AB CMOS Capacitor Multiplier and Precision Rectifiers.** *IEEE Transaction on Very Large Scale Integrated Systems (TVLSI)*  
Pourashraf, S., Ramirez-Angulo, J., Hinojo Montero, J., González-Carvajal, R., Lopez-Martin, A. J.  
2018
- **Ultra Low Voltage Gate Driven Bandpass PGA with Constant Bandwidth**  
Pourashraf, S., Ramirez-Angulo, J., Diaz-Sanchez, A., IEEE  
IEEE.2018
- **Continuous and Discrete Time Low Voltage Analog Circuits in 16 nm CMOS Technology.**  
Pourashraf, S., Ramirez-Angulo, J., Díaz-Armendariz, A.  
2018 IEEE International Symposium on Circuits and Systems (ISCAS).2018
- **An Amplified Offset Compensation Scheme and its Application in a Track and Hold Circuit.** *IEEE Transactions on Circuits and Systems II (TCAS-II)*  
Pourashraf, S., Ramirez-Angulo, J., Cabrera-Galicia, A. R., Lopez-Martin, A. J., González-Carvajal, R.  
2018; 65 (4): 416 - 420
- **An Op-amp Approach for Bandpass VGAs with Constant Bandwidth.** *IEEE Transactions on Circuits and Systems II (TCAS-II)*  
Pourashraf, S., Ramirez-Angulo, J., Algueta-Miguel, J., Lopez-Martin, A. J., González-Carvajal, R.  
2018; 65 (9): 1144 - 1148
- **A Highly Efficient Composite Class-AB-AB Miller Op-amp with High Gain and Stable from 15 pF up to Very Large Capacitive Loads.** *IEEE Transaction on Very Large Scale Integrated Systems (TVLSI)*  
Pourashraf, S., Ramirez-Angulo, J., Lopez-Martin, A. J., González-Carvajal, R.  
2018; 26 (10): 2061 - 2072
- **$\pm 0.18$  V Supply Gate Driven PGA with 0.7 Hz to 2 kHz Constant Bandwidth and 0.15  $\mu$ W Power Dissipation.** *International Journal of Circuit Theory and Application (IJCTA)*  
Pourashraf, S., Ramirez-Angulo, J., Lopez#Martin, A. J., González-Carvajal, R., Díaz#Sánchez, A.  
2017; 46 (2): 272-279
- **Offset compensation in a track and hold circuit.**  
Pourashraf, S., Ramirez-Angulo, J., Cabrera-Galicia, A. R., Lopez-Martin, A. J., González-Carvajal, R.  
2017 IEEE 60th International Midwest Symposium on Circuits and Systems (MWSCAS).2017
- **A super class-AB OTA with high output current and no open loop gain degradation.**  
Pourashraf, S., Ramirez-Angulo, J., Lopez-Martin, A. J., González-Carvajal, R.  
2017 IEEE 60th International Midwest Symposium on Circuits and Systems (MWSCAS).2017
- **Super Class-AB OTA without Open Loop Gain Degradation Based on Dynamic Cascode Biasing.** *International Journal of Circuit Theory and Application (IJCTA)*  
Pourashraf, S., Ramirez-Angulo, J., Lopez-Martin, A. J., González-Carvajal, R.  
2017; 45 (5): 2111-2118
- **High current efficiency class-AB OTA with high open loop gain and enhanced bandwidth.** *IEICE Letters, Electronics Express*  
Pourashraf, S., Ramirez-Angulo, J., Roman-Loera, A., Lopez-Martin, A. J., Diaz-Sanchez, A., González-Carvajal, R.  
2017; 14 (17): 20170719
- **Implementation of a Low Power 16-bit Radix-4 Pipelined SRT Divider Using a Modified Data Driven Dynamic Logic (D3L) Structure.** *Microelectronics Journal*  
Pourashraf, S., Sayedi, S.  
2013; 44 (12): 1165-1174
- **A low power D3L 16-bit radix- 4 pipelined SRT divider.**  
Pourashraf, S., Sayedi, S.

2012 25th IEEE Canadian Conference on Electrical and Computer Engineering (CCECE).2012

- **A novel 4#2 compressor for high speed and low power applications.**

Pourashraf, S., Sayedi, M.

2010 18th IEEE Iranian Conference on Electrical Engineering.2010