Dr. Sara S. Ghoreishizadeh

Junior Research Fellow, Imperial College London

Personal information

Address: Centre for Bio-Inspired Technology, B422, Bessemer Building
Imperial College London, SW7 2AZ, UK

Email: s.ghoreishizadeh14@imperial.ac.uk

Phone: +44 79 4821 2458

Web page: http://wwwf.imperial.ac.uk/∼ssg14/, Google Scholar page

Employment

Dec. 2015-present **Junior Research Fellow**, Dept. of Electrical and Electronic Eng., Imperial College London, UK

April 2015-Nov. 2015 **Research Associate**, Dept. of Electrical and Electronic Eng., Imperial College London, UK

Oct. 2010-Mar 2015 **Research Assistant**, Integrated Systems Laboratory (LSI), École Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Education

Oct. 2010-Mar. 2015 **PhD**, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland
Thesis title: *Integrated electronics to control and readout biosensors in implantable applications*, Thesis supervisors: Giovanni De Micheli and Sandro Carrara,
Thesis committee: Pantelis Georgiou, Catherine Dehollain, and Roland Thewes

Sept. 2007-Dec. 2009 **MSc**, Sharif University of Technology, Iran,
Major: Electronics, Minor: Microelectronics Circuits, *GPA: 17.03/20*
Thesis title: *Design and implementation of IC to readout an array of sensors in low temperature (77K)*

Sept. 2003-Sept. 2007 **BSc**, Sharif University of Technology, Iran,
Major: Electrical Engineering, Minor: Electronics, *GPA: 17.96/20*

Sept. 1999-Sept. 2003 **High school diploma**, National Organization for Development of Exceptional Talents (NODET), Iran, Major: Mathematics and Physics, *GPA: 19.2/20*

Research Funding and Honours

Jan. 2018 **eFutures Early Career Researcher Sandpit Award** (total £18.1k), EPSRC eFutures, UK.
I was awarded the ECR Sandpit funding to direct a research project on power-autonomous and self-calibrating wearable glucose sensor. This is a multi-site (i.e. ICL, Bath University, University of Newcastle) multi-disciplinary (i.e. Microelectronics, Bioengineering, energy harvesting) pilot study and the award provides research grant for a period of six months (February-September 2018).

Feb. 2015 **Junior Research Fellowship** (total £160k), Imperial College London (ICL), UK.
I won the prestigious JRF award (currently known as Imperial College Research Fellowship) to pursue my research vision. JRF acceptance rate is ∼15% (20 awarded out of 130 applicants across all disciplines and nationalities). The award provides salary plus a generous 30k GBP research grant for three years.

Sept. 2010 **PhD Scholarship** awarded at EEE department, EPFL, Switzerland.

June 2007 **In top 1%** of 10,000 participants in "national entrance examination for M.Sc. in electrical engineering", Iran. I secured the government scholarship for MSc studies.

Aug. 2003 **In top 0.01%** of 450,000 participants in "national university entrance examination", Iran. I secured the government scholarship for my BSc studies at the top university.

Press

BBC News Under the skin blood-testing device developed

Sky News Mini blood labs can predict a heart attack
These show two implantable devices developed using the integrated circuits that I designed and demonstrated in my publications [J3, J4, J5, C10, C11, C13].

ICL Faculty of Eng. News Undergraduate project wins international conference award
My MEng student, Daryl Ma, won the Best Student Paper award in IEEE BioCAS 2017 conference for his paper [C19] on his MEng FYP.

Professional experience

Dec. 2015-Nov. 2018 **Junior Research Fellow**, Dept. of Electrical and Electronic Eng., ICL, UK
My research is focused on developing Lab-on-CMOS as well as circuits and systems to enable miniaturised and autonomous electrochemical sensing on CMOS. I volunteered and taught lectures in undergraduate and graduate courses and have so far supervised 12 students towards PhD, MSc or MEng degrees.

April 2015-Nov. 2015 **Research Associate**, Dept. of Electrical and Electronic Eng., Imperial College London, UK
I was involved in CANDO project. I designed and developed an on-chip interface for recovering power and providing full-duplex communication over an ac-coupled implantable lead between active implantable devices. This innovative design has lead to 66% power transfer efficiency with the least number of wires.

Oct. 2010-Mar 2015 **Research Assistant**, Integrated Systems Laboratory (LSI), EPFL, Switzerland,
I designed and implemented low-power analogue/mixed-signal IC for implantable biosensors. I designed circuits to control and readout both amperometric and potentiometric electrochemical biosensors. I was in charge of closing an interdisciplinary project which developed a wireless integrated device for human metabolite sensing.

May 2010-Sept. 2010 **VLSI design engineer**, EPFL, Switzerland,
I designed a sub-Hertz waveform generator with mixed-signal CMOS circuits in 0.18 μm technology.

Sept. 2007- Dec. 2009 **Microelectronics engineer**, Integrated System Design Laboratory (ISDL), Sharif University of technology, Iran
I designed and tested readout ICs in 0.18 μm and 0.5 μm technologies. The ICs measure an image sensor current in the range of pA to μA. I successfully tested the ICs at room temperature and at liquid Nitrogen (77K). Moreover, I took several intensive courses on analogue and digital design, including CMOS circuits, RFIC, MMIC, data converters, and digital electronics.

Membership and services

Editorship	On the editorial board of the Journal of Microelectronics (2015-present)
Committees	IEEE Biomedical Circuits and Systems Technical Committee (elected 2018), Department Opportunities Committee (Imperial College, Dept of EEE)
RCM or TPC (Technical Program Committee)	IEEE Conference on Electronics Circuits and Systems (ICECS) 2016-2018, IEEE Conference on Biomedical Circuits and Systems (BioCAS) 2017-2018, IEEE NEWCAS 2018 IEEE International Symposium on Medical Measurements and Applications 2018
Session chair	IEEE ICECS 2016, IEEE BioCAS 2017
Reviewer	Journals: IEEE TBioCAS, IEEE TCAS-I, IEEE TCAS-II, IEEE Sensors journal, IEEE Sensors Letters. Conferences: IEEE BioCAS, IEEE ISCAS, IEEE Sensors
Member	IEEE, IET, Circuits and Systems (CASS), Solid-State Circuit (SSCS), Engineering in Medicine and Biology (EMBS), Women in CAS (WiCAS)
Networks	member of EPSRC eFutures and EPSRC Energy Harvesting
Events	Co-organiser of the "How to get a Fellowship?" event at Dept. of EEE, ICL
Marker	MEng and MSc theses (2016, 2017) and BEng final year project (2015)

Student Supervision

PhD	Dorian Haci (since Oct 2016; joint with Dr. Timothy Constandinou)
PhD	Daryl Ma (from Oct 2018, awarded full overseas scholarship from EEE, ICL)
MSc (2018)	Vinnothini Rasalingam, Bruno Donato (joint with Dr. Pantelis Georgiou)
MSc (2017)	Bournas Charalampos, Andrea Mifsud (joint with Dr. Yan Liu), **best thesis award**
MSc (2016)	Chang Gao (joint with Dr. Timothy Constandinou), **best thesis award** Xiaotian Zhang (joint with Dr. Pantelis Georgiou)
MEng (2018)	Wei Ting
MEng (2017)	Daryl Ma **(received Best Student Paper Award in IEEE BioCAS'17)**, Wei Te
MEng (2016)	Pascal Loose, Christian Lending (both joint with Dr Pantelis Georgiou)

Teaching Experience

(Guest) Lecturer

2017	*Biomedical electronics course, 6×1hour* - Imperial College London, UK
2016	*Biomedical electronics course, 4×1hour* - Imperial College London, UK
2015	*Full-custom IC design course, 1hour* - Imperial College London, UK

2014 *Bio-nano-chip design course, 2×1hour* - EPFL, Switzerland

Teaching Assistant

2015 *Full-custom IC design, 3×2hour* - Imperial College London, UK

2012 *Lab in EDA based design, 4×3hour* - EPFL, Switzerland

2009 *Electronics II, 6×1hour*, Sharif University of Technology, Iran

2009 *Electronics Lab, 6×3hour*, Sharif University of Technology, Iran

Invited Talks

TBC 2018 Sensor and Actuator Systems group, Technical University of Berlin, Germany, Host: Prof Ronald Thewes

May 2018 IEEE International Symposium on Circuits and Systems (ISCAS) 2018, Italy
Invited talk on [J8]: A differential electrochemical readout ASIC with heterogeneous integration of bio-nano sensors for amperometric sensing, 20 minutes

May 2018 IEEE ISCAS 2018, Italy, Invited talk on [J7]: 4-wire interface ASIC for a multi-implant link, 20 minutes

Mar 2018 Dept. of Electrical and Electronic Engineering, Imperial College London,
title: Biosensing Microsystems, Integration and Autonomy, 20 minutes

Jan 2018 Ecole Superieure d'Ingenieurs en Electrotechnique et Electronique (ESIEE), Paris,
title: Integrated circuit and system design for next-generation bio-sensing medical devices, 1 hour

Nov 2017 Dept. of Electronic and Nanoscale Engineering, University of Glasgow, UK
title: Integrated circuit and system design for next-generation multi-metabolite sensing devices, 1 hour

Sept 2017 Dept. of Electrical and Electronic Engineering,University College London, UK
Integrated circuit and system design for next-generation bio-sensing devices, 2 hours

Sept 2014 Integrated Systems Laboratory, EPFL, Switzerland
title: An integrated platform for differential electrochemical sensing, 1hour

Dec 2013 Dept. of Electrical and Electronic Engineering, Imperial College London, UK,
title: Sub-mW ASIC design for implantable biosensing platform, , 30 minutes

Nov 2013 Institute of Neuroinformatics Engineering, University of Zurich, Switzerland
title: A sub-mW configurable ASIC to control, readout, and calibrate an array of biosensors, 30 minutes

Outreach

I am pleased to take part in the launch of a new award called Science Toy Award. The award aims to celebrate and support outstanding toys that help develop STEM skills in primary school children. Every year, the toy-candidates are short-listed during Imperial Festival and the winner is selected by primary school students in the UK. This year, 20,000 people visited the festival. We also communicate the Science Toy Award idea to the public through various other events such as Science Museum Lates.

Publications

Journal papers in preparation

[MJ2] *A wireless system for continuous in-mouth pH sensing,*
Daryl Ma, David ME Freeman, Danny O'Hare, and **S. S. Ghoreishizadeh**,
Invited paper for the special issue of IEEE Transactions on Biomedical Circuits and Systems (TBCAS) on best papers of BioCAS 2017 **Re:[C19]**

[MJ1] *An autonomous readout circuit for amperometric bio-sensing*
Wei Te, **S. S. Ghoreishizadeh**

Journal papers

[J9] *Study of electrochemical impedance of a continuous glucose monitoring sensor and its correlation with sensor performance*
S. S. Ghoreishizadeh, X. Zhang, S. Sharma, and P. Georgiou, IEEE Sensors letters, vol. 2, no.1, 2018 doi: 10.1109/LSENS.2017.2778248

[J8] *A differential electrochemical readout ASIC with heterogeneous integration of bio-nano sensors for amperometric sensing*
S. S. Ghoreishizadeh, I. Taurino, G. De Micheli, S. Carrara, and P. Georgiou,
IEEE Transaction on Biomedical Circuits and Systems (TBCAS), vol 11, no 5, pp 1148 - 1159, 2017, doi: 10.1109/TBCAS.2017.2733624
(invited for oral presentation at IEEE Conference on Circuits and Systems (ISCAS), May 2018, Florence, Italy)

[J7] *4-wire interface ASIC for a multi-implant link,*
S. S. Ghoreishizadeh, D. Haci, Y. Liu, N. Donaldson, and T. G. Constandinou
available online, IEEE Transactions on Circuits and Systems I: regular papers (TCAS-I), pp 1-12, 2017, doi: 10.1109/TCSI.2017.2731659
(invited for oral presentation at IEEE Conference on Circuits and Systems (ISCAS), May 2018, Florence, Italy)

[J6] *An innovative system of membranes for the monitoring of endogenous and exogenous metabolites,*
C. Baj-Rossi, **S. S. Ghoreishizadeh**, G. De Micheli, and S. Carrara,
Journal of BioNanoScience, vol 6, no 2, pp 85-92, 2016,
doi:10.1007/s12668-016-0196-y

[J5] *A subcutaneous biochip for remote monitoring of human metabolism: packaging and biocompatibility assessment*,
A. Cavallini, T. Rezzonico Jost, **S. S. Ghoreishizadeh**, J. Olivo, M. Op de Beeck, B. Gorissen, B. F. Grassi, G. De Micheli, and S. Carrara,
IEEE Sensors Journal, vol 15, no 1, pp 417-424, 2015, doi:10.1109/JSEN.2014.2339638

[J4] *A system for wireless power transfer and data communication of long-term bio-monitoring*
E. G. Kilinc, C. Baj-Rossi, **S. S. Ghoreishizadeh**, S. Riario, F. Stradolini, C. Boero, G. De Micheli, F. Maloberti, S. Carrara, and C. Dehollain,
IEEE Sensors Journal, vol 15, no 11, pp 6559-6569, 2015, doi: 10.1109/JSEN.2015.2462362

[J3] *An integrated control and readout circuit for implantable multi-target electrochemical biosensing,*
S. S. Ghoreishizadeh, C. Baj-Rossi, A. Cavallini, S. Carrara, and G. De Micheli,
IEEE TBCAS, vol 8, no 6, pp 891-898, 2014, doi: 10.1109/TBCAS.2014.2315157

[J2] *Full fabrication and packaging of an implantable multi-panel device for monitoring of metabolites in small animals*
C. Baj-Rossi, E. G. Kilinc, **S. S. Ghoreishizadeh**, D. Casarinoz, T. Rezzonico Jost, C. Dehollain, F. Grassi, L. Pastorino, G. De Micheli and S. Carrara,
IEEE TBCAS, vol 8, no 5, pp 636-647, 2014, doi: 10.1109/TBCAS.2014.2359094

[J1] *Fully integrated biochip platforms for advanced healthcare,*
S. Carrara, **S. S. Ghoreishizadeh**, J. Olivo, I. Taurino, C. Baj-Rossi, A. Cavallini, M. Op de Beeck, C. Dehollain, W. Burleson, F. G. Moussy, A. Guiseppi-Elie, and G. De Micheli, Sensors journal, vol 12, no 8, pp 11013-11060, 2012, doi: 10.3390/s120811013

Filed Patent

[P1] *On-chip random ID generation*
S. S. Ghoreishizadeh, and T. G. Constandinou, GB, 2017, Available here

Refereed Conference Proceedings

[C19] *A wireless system for continuous in-mouth pH sensing,*
D. Ma, C. Mason, and **S. S. Ghoreishizadeh**,
IEEE Conference on Biomedical Circuits and Systems (BioCAS), 2017, **Best Student Paper Award,** doi: 10.1109/BIOCAS.2017.8325556

[C18] *Adaptive Power Regulation and Data Delivery for Multi-Module Implants*
A. Mifsud, D. Haci, **S. S. Ghoreishizadeh**, Y. Liu, and T. G. Constandinou,
IEEE BioCAS 2017 doi: 10.1109/BIOCAS.2017.8325208

[C17] *On-chip ID Generation for multi-node implantable devices using SA-PUF,*
Chang Gao, **S. S. Ghoreishizadeh**, Y. Liu, and T. G. Constandinou
IEEE international symposium on Circuits and Systems (ISCAS), 2017, doi: 10.1109/ISCAS.2017.8050422

[C16] *A 4-wire interface SoC for shared multi-implant power transfer and full-duplex communication,*
S. S. Ghoreishizadeh, D. Haci, Y. Liu, and T. G. Constandinou
IEEE Latin American symposium on Circuits and Systems (LASCAS), 2017, doi: 10.1109/LASCAS.2017.7948050
(Invited for special issue of IEEE TCAS-I on 10 best papers of CASS Flagship Conferences: LASCAS 2017, ICECS 2016, and APCCAS 2016)

[C15] *An integrated platform for differential electrochemical and ISFET Sensing,*
S. S. Ghoreishizadeh, P. Georgiou, S. Carrara, and Giovanni De Micheli,
IEEE ISCAS, 2016, doi: 10.1109/ISCAS.2016.7539193

[C14] *Full-system for translational studies of personalized medicine with free-moving mice,*
S. Carrara, C. Baj-Rossi, **S. S. Ghoreishizadeh**, S. Riario, G. Surrel, F. Stradolini, C. Boero, G. De Micheli, E. G. Kilinc, and C. Dehollain
IEEE ISCAS, 2015, doi: 10.1109/ISCAS.2015.7168998

[C13] *Sub-mW reconfigurable interface IC for electrochemical sensing,*
S. S. Ghoreishizazdeh, C. Boero, A. Pullini, C. Baj-Rossi, S. Carrara, and G. De Micheli,
IEEE Biomedical Circuits and Systems Conference (BioCAS), 2014, doi: 10.1109/BioCAS.2014.6981705

[C12] *A Lightweight cryptographic system for implantable biosensors*
S. S. Ghoreishizadeh, T. Yalcin, A. Pullini, G. De Micheli, W. Burleson, and S. Carrara,
IEEE BioCAS, 2014, doi: 10.1109/BioCAS.2014.6981765

[C11] *A configurable IC to control, readout, and calibrate an array of biosensors,*
S. S. Ghoreishizadeh, S. Carrara and G. De Micheli,
IEEE European Conference in Circuit Theory and Design (ECCTD), Germany, 2013, doi: 10.1109/ECCTD.2013.6662331

[C10] *An implantable bio-micro-system for drug monitoring,*
S. S. Ghoreishizadeh, E. G. Kilinc, C. Baj-Rossi, C. Dehollain, S. Carrara, and G. De Micheli,
IEEE BioCAS, the Netherlands, 2013, doi: 10.1109/BioCAS.2013.6679678

[C9] *Empirical study of noise dependence in electrochemical Sensors,*
S. S. Ghoreishizadeh, G. Nanda, S. Carrara, and G. De Micheli,
IEEE International Workshop on Advances in Sensors and Interfaces (IWASI), Italy, 2013, doi: 10.1109/IWASI.2013.6576080

[C8] *Fabrication and packaging of a fully implantable biosensor array,*
C. Baj-Rossi, E. G. Kilinc, **S. S. Ghoreishizadeh**, D. Casarinox, T. Rezzonicox, C. Dehollain, F. Grassix, L. Pastorinoz, G. De Micheli and S. Carrara, IEEE BioCAS, 2013, doi: 10.1109/BioCAS.2013.6679665
(Invited for special issue of IEEE TBCAS on 10 best papers of BioCAS 2013)

[C7] *Electronic implants: power delivery and management,*
J. Olivo, **S. S. Ghoreishizadeh**, S. Carrara, and G. De Micheli,
Design Automation and Test in Europe Conference and Exhibition (DATE), France, 2013, doi: 10.7873/DATE.2013.313

[C6] *Developing highly-integrated subcutaneous biochips for remote monitoring of human metabolism,*
S. Carrara, A. Cavallini, **S. S. Ghoreishizadeh**, J. Olivo, and G. De Micheli,
IEEE Sensors conference, Taiwan, 2012, doi: 10.1109/ICSENS.2012.6411167

[C5] *Design, fabrication, and test of a sensor array for perspective biosensing in chronic pathologies,*
A. Cavallini, C. Baj-Rossi, **S. S. Ghoreishizadeh**, G. De Micheli, and S. Carrara,
IEEE BioCAS, Taiwan, 2012, doi: 10.1109/BioCAS.2012.6418404

[C4] *A current-mode potentiostat for multi-target detection tested with different lactate biosensors,*
S. S. Ghoreishizadeh, I. Taurino, S. Carrara, and G. De Micheli,
IEEE BioCAS, Taiwan, 2012, doi: 10.1109/BioCAS.2012.6418403

[C3] *Nano-sensor and circuit design for anti-cancer drug detection,*
S. S. Ghoreishizadeh, C. Baj-Rossi, S. Carrara, and G. De Micheli,
IEEE/NIH 5th Life Science Systems and Applications (LiSSA) Workshop, USA, 2011, doi: 10.1109/LISSA.2011.5754147

[C2] *Circuit design for human metabolites biochip,*
S. S. Ghoreishizadeh, S. Carrara, and G. De Micheli, IEEE BioCAS, USA, 2011, doi: 10.1109/BioCAS.2011.6107827

[C1] *An integrated platform for advanced diagnostics,*
G. De Micheli, **S. S. Ghoreishizadeh**, C. Boero, F. Valgimigli and S. Carrara, DATE, France, 2011, doi: 10.1109/DATE.2011.5763235