Rabah M. **Al abdi**

Curriculum Vitae

Date Prepared: January 30th, 2020
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Field of Specialization:

Biomedical sensors and instrumentation, Machine learning, signal and image processing, electronics, control systems**.**

ACADEMIC QUALIFICATIONS

Year	Degree obtained
Dec. 2012	Doctor of Philosophy (Ph.D) in Biomedical Engineering with a specialization in Diagnostic Techniques. Doctoral thesis title "Optomechanical Imaging System for Breast Cancer Detection" **State University of New York Downstate Medical Center, Brooklyn, New York, USA**
June 2007	Master degree of Science (MSc) in Biomedical Engineering with a specialization in Bioinstrumentation and Medical Imaging. "Excellent" GPA 3.8 **Polytechnic Institute of New York University, Brooklyn, New York, USA**
June 2003	Bachelor degree of Science (BSc) in Biomedical Engineering "Excellent" grade (Average 84.2%) **Jordan University of Science and Technology, Irbid, Jordan**

PROFESSIONAL & WORK EXPERIENCES

Period	Position	Educational Institution
March 2013 - **Present**	Assistant Professor	Biomedical Engineering Department, Faculty of Engineering, Jordan University of Science & Technology, Irbid, Jordan
June 2018 – Sep. 2018	Visiting Scholar	Harvard Medical School Martinos Center for Biomedical Imaging, Massachusetts General Hospital, Charlestown, Massachusetts, USA
Sept. 2014 – Sept 2015	Acting Chairman	Biomedical Engineering Department, Faculty of Engineering, Jordan University of Science & Technology, Irbid, Jordan
Oct. 2012 – March 2013	Full time lecturer	Biomedical Engineering Department, Faculty of Engineering, Jordan University of Science & Technology, Irbid, Jordan
Sept. 2007 – Aug. 2012	Graduate Research Assistant	Pathology Department, State University of New York Downstate Medical Center, Brooklyn, New York, USA
Sept. 2005 – Aug. 2007	Graduate Research Assistant	Biomedical Engineering Department, Polytechnic Institute of New York University, Brooklyn, New York, USA
July 2003 – Aug. 2005	Maintenance Engineer	The Directorate of Biomedical Engineering, Royal Scientific Society, Amman, Jordan

TEACHING EXPERIENCE:

Courses Taught:

1. Analysis of Signals and Systems
2. Biomedical Instrumentation I and II
3. Enginering Training
4. Biomedical Engineering Design
5. Biomedical Instrumentation Lab
6. Digital Logic Design And Computer Architecture Lab
7. Introduction to Linear Systems
8. Magnetic Resonance Imaging (MRI)
9. Electronics I & II

10. Electronics Lab
11. Numerical Methods for Engineers
12. Statistics for Engineers
13. Digital Image Processing
14. Bio-optics (graduate level)

Courses can be taught

Probability and Statistics
Electric Circuits I & II
Electric Circuits lab
Electronic Circuits I & II
Electronic Circuits Lab
Digital Logic Design
Digital Logic Design Lab
Signals & Systems
Control Systems
Signal Analysis & Filtering
Computer Programming
Instrument & Control Lab
Sensors and Instrumentation
Biomedical Instrumentation
Embedded System Design
Wireless Networks and Applications
Numerical Methods in Engineering
Artificial Neural Networks
Microprocessors
Linear Algebra
Microprocessors Lab
Computer Architecture & Organization
Digital Signal Processing
Digital Electronics
Advanced Control Systems
Sensors Design and Applications
Electrical Engineering Design
Introduction to Computer Systems
Discrete Mathematics
Design Project I and II

Master's Theses

2016: Early Detection of Cardiac Diseases Using Photoplethysmography (PPG) Signals
2018: Developing an MRI Based Model to Detect Multiple Sclerosis

Graduation projects

2012 Non-invasive glucose measurement using mutiple wavelengths PPG
2013 Non-contact Diagnosis of Obstructive Sleep Apnea

2014 Using Monte Carlo Algorithm in Matlab to predict and simulate the light propagation in a homogenous biological tissue medium.
2014 Detection of diabetes based on PPG signals
2014 Mental Stress detection besed on PPG signals and galvanic skin resistance
2015 Mental stress detection based on PPG signals and pupil dimater variation
2015 ECG Analyzer for Heart diseases
2016 Light a lamp using EMG
2017 Eye pressure measurement from optic coherence tomography
2017 Using blood pressure, SPO2, and heart rate correlation, to predict smoking
2018 A urin color-detecting device for home healthcare
2018 Stress study among college students (analysis and design)
2018 Infusion Pump Using Arduino
2019 Prediction of glucose level based on concurent measurement of PPG and EEG
2019 Blind Supporting System

RESEARCH GRANTS:

Current Grant Support

2019-2022 Project Title: "Development of novel methods and technologies for the diagnosis, monitoring and treatment of diabetic foot syndrome"
Granting Agency: President's Global Innovation Fund/ New York/ USA
Principal Investigator: A.H. Hielscher and R. Al abdi
Size of Grant: $50,000
This project includes conducting clinical studies using a vascular optical tomographic imaging (VOTI) system, which was developed at Columbia University. Researchers and physicians from the King Abdullah University Hospital (KAUH) and the Jordan University Hospital (JUH) in Jordan will perform the clinical studies on diabetic patients with peripheral artery disease (PAD) and diabetic foot syndrome (DFS). The goal is to show that VOTI can be employed to diagnose PAD and DFS accurately, as well as to predict treatment outcome.

2018-2019 Project title: "Novel methods and technologies to diagnose, monitor and treat diabetic food syndrome"
Granting agency: President's Global Innovation Fund/ Columbia University/ New York/ USA
Principle Investigator: A. Hielscher and R. Al abdi
Size of grant: $ 25,000

The overall goal of this planning grant is to take first steps towards viable collaborations between engineers, scientists and physicians at Columbia University/ New York and universities and hospitals in the Middle East to develop methods and technologies to diagnose, monitor and treat diabetic foot syndrome and related symptoms.

2017-2020 Project title: "How well do prenatal ultrasound images and clinical data predict the mode of delivery: an analysis to help hospitals containing costs and improving quality"
Granting agency: The Deanship of Research, Jordan University of Science and Technology, Jordan.
Principle Investigator: R. Al abdi
Size of grant: $ 8,000
The goal of this project is to design a computer-aided prediction system for mode of delivery based on the extracted features from prenatal ultrasound images and clinical -sociodemographic data, and to estimate the cost of different modes of delivery (e.g. normal vs. cesarean delivery) and understand the resource-use implications of each mode.

2015-2020: Project title: "Resting state quantitative electroencephalography (QEEG) for autism diagnosis"
Granting agency: The Ministry of Higher Education and Research, Jordan.
Principal Investigator: E. Abdulhay (Co-PI: R. Al abdi)
Size of grant: $ 135,000
The goal of this project to develop and validate a standardized technique that can be used for diagnosis and continuous evaluation of Autism, and to investigate the use of QEEG for diagnosis, prognosis and monitoring of autism intervention effectiveness.

2014-2018 Project title: "Early detection of heart diseases and prediction of sudden cardiac death from physiological signals"
Granting agency: The Dean of Research, Jordan University of Science and Technology, Jordan
Principal Investigator: R. Al abdi
Size of grant: $ 10,000
This study aims to develop computer-aided detection by extracting biomarkers from physiological signals (such as ECG and continuous blood pressure signals) to diagnose cardiac diseases and predict sudden cardiac death for patients in intensive care units.

Pending Grant Support

2020-2024 Project title: “Development of diffuse optical imaging for the diagnosis and monitoring of peripheral artery disease”
Granting agency: Ministry of Higher Education & Scientific Research, Amman, Jordan
Principal Investigator: R. Al abdi and A.H. Hielscher
Size of Grant: $100,000

SCHOLARSHIPS AND AWARDS

Period	Scholarship/Award	Institution
2012	The OSA prize for best paper presented	Optical Society of America (OSA) 2012 meeting, Miami, Florida, USA
2009	The SPIE prize for best paper presented	The international society for optics and photonics (SPIE), National Institute of Health (NIH) 2009 workshop, Bethesda, Maryland, USA
2007-20012	Full scholarship to obtain a Ph.D. degree in Biomedical Engineering from State University of New York Downstate Medical Centre, Brooklyn, New York, USA	Jordan University of Science and Technology, Irbid, Jordan
2007	The first place award for distinguished M.Sc. graduation project	Polytechnic Institute of New York University, Brooklyn, New York, USA
2005-2007	Full scholarship to obtain a M.Sc. degree in Biomedical Engineering from the Polytechnic Institute of New York University, Brooklyn, New York, USA	Jordan University of Science and Technology, Irbid, Jordan
2003	The first place prize for distinguished B.Sc. graduation project	Department of Biomedical Engineering/ Jordan University of Science and Technology, Irbid, Jordan

SKILLS

- C/C++

- Assembly (Microprocessor Programming Language)
- VHDL
- LabVIEW
- MATLAB
- Eagle (Printed Circuit Board Design)
- AutoCAD (Computer aided design)
- Advanced statistical analysis (SPSS)
- Weka
- Arduino Python

PROFESSIONAL SOCIETIES:

- Optical Society of America (OSA)
- The International Society for Optical Engineering (SPIE)
- IEEE

AREAS OF INTEREST

- Medical signal and image processing
- Diffuse optical tomography
- Machine learning
- Medical Informatics
- Mental stress evaluation
- Prenatal ultrasound imaging
- Computer-aided-diagnosis for cardiac diseases.
- Sensors
- Robotics

PROFESSIONAL ACTIVITIES

- *Scientific Journal and conference Review:*
  - Journal of BMC Medical Informatics and Decision Making (2019)
  - *Journal of Medical and Biological Engineering and Computing (2018)*
  - Journal of Biomedical Engineering Online (2017)
  - 39th Annual International Conference of the IEEE Engineering in Medicine and Biology (2016)
  - *2015 IEEE Jordan Conference on Applied Electrical Engineering and Computing Technologies (AEECT) (2015)*

- *Dec 2018*: Organizing a regional workshop titled "Challenges and Opportunities in Diagnosing, Monitoring and Treating Peripheral Arterial Disease and Diabetic Foot Syndrome" in collaboration with Columbia University/New York in Amman, Jordan
- *April 2015*: Organizing the second scientific day for biomedical engineering that was held in Jordan University of Science and Technology, Irbid, Jordan
- *2015-Present*: member of the scientific research committee in the department of Biomedical Engineering in Jordan Univ. Sci. and Tech.
- *2017*-2018: member in the biomedical engineering Master curriculum committee
- *2015*-present: member of the Accreditation Board for Engineering and Technology (ABET) in the Biomedical Engineering Department.

PUBLICATIONS:

Peer-review journal articles:

1. **R. Al abdi**, H. Alshraideh, H. Hijazi, M. Jarrah, M. Alyahya, "The use of echocardiographic and clinical data recorded on admission to simplify decision making for elective percutaneous coronary intervention: a prospective cohort study", Medical Informatics and Decision Making, Vol (**19**), (2019). DOI 10.1186/s12911-019-0797-9.
2. E. Abdulhay, M. Alafeef, L. Alzghoul, M. Al Momani, **R. Al Abdi**, N. Arunkumar, R. Munoz, and V.H.C de Albuquerque, "Computer-aided autism diagnosis via second-order difference plot area applied to EEG empirical mode decomposition", Neural Computing and Applications (2018). DOI 10.1007/s00521-018-3738-0.
3. A.K. Al-bashir, M.A. Al-abed, H.K. Amari, F.M. Al-rousan, O.M.K Bashmaf, E.W. Abdul Hay, **R. Al abdi**, N. Arunkumar, B.R. Tapas Bapu, and A.K Al-bashir, "Computer-based Cobb angle measurement using deflection points in adolescence idiopathic scoliosis from radiographic images," Neural Computing and Applications, Vol. (), 2018. DOI: 10.1007/s00521-018-3614-y
4. **R. Al abdi**, A.E. Alhitary, E.W. Abdul Hay, and A.K. Al-bashir, "Objective detection of chronic stress using physiological parameters," Medical & Biological Engineering & Computing, Vol (), 2018. https://doi.org/10.1007/s11517-018-1854-8.
5. H.H. Hijazi, H. L. Harvey, M.S. Alyahya, H.A. Alshraideh, **R. Al abdi**, and S Parahoo, "The Impact of Applying Quality Management Practices on Patient Centeredness in Jordanian Public Hospitals: Results of Predictive Modeling", Inquiry, Accepted Dec 2017.
6. M.S. Alyahya, H.H. Hijazi, H.A. Alshraideh, M.A. Alsharman, **R. Al abdi**, and H. L. Harvey, "Integrating the Principles of Evidence Based Medicine and Evidence Based Public Health: Impact on the Quality of Patient Care and Hospital Readmission Rates in Jordan," International Journal of Integrated Care, vol. 16, no. 3, p. 12, Aug. 2016.

7. H.L. Graber, **R. Al abdi**, Y. Xu, A.P. Asarian, P.J. Pappas, L. Dresner, N. Patel, K. Jagarlamudi, W. B. Solomon, and R.L. Barbour, "Enhanced resting-state dynamics of the hemoglobin signal as a novel biomarker for detection of breast cancer," Medical Physics, Vol. 42, 6406 (2015).
8. **R. Al abdi**, H.L. Graber, Y. Xu, and R.L. Barbour, "Optomechanical imaging system for breast cancer detection," *J. Optical Society of America A*, Vol. 28, pp. 2473-2493 (2011).
9. M.L. Flexman, M.A. Khalil, **R. Al abdi**, H.K. Kim, C.J. Fong, E. Desperito, D.L. Hershman, R.L. Barbour, and A.H. Hielscher, "Digital optical tomography system for dynamic breast imaging," *J. Biomedical Optics*, Vol. 16, 076014 (2011).
10. R.L. Barbour, R. Ansari, **R. Al abdi**, H.L. Graber, M.B. Levin, Y. Pei, C.H. Schmitz, and Y. Xu, "Validation of near infrared spectroscopic (NIRS) imaging using programmable phantoms," Paper 687002 in *Design and Performance Validation of Phantoms Used in Conjunction with Optical Measurements of Tissue (Proceedings of SPIE, Vol. 6870)*, R.J. Nordstrom, Ed. (2008).

Patent:

- R.L. Barbour, **R. Al Abdi**, "Self-referencing optical measurement for breast cancer detection", United States Patent Application 9724489B2, April 2017.

Conference proceeding papers and abstracts:

1. **R. Al abdi**, “The use of artificial intelligence to predict the outcomes of elective percutaneous coronary intervention using clinical factors”, Innovation Arabia 12, Dubai, UAE, Feb. 2019.
2. **R. Al abdi** and M. Jarrah, “Cardiac desease classification using total variation denoising and Morlet continuous wavelet transformation of ECG signals,” 2018 IEEE 14th international colloquium on signal processing and its application (CSPA 2018), Penang, Malaysia, March 2018.
3. **R. Al abdi,** A Alhirtary, “Evaluation of mental stress by measuring four physiological signals simultaneously”, Second international conference on medical physics and biophysics, Barcelona, Spain (November 7-8, 2016).
4. X. Sui, L. Yin, I. Selesnick, H.L. Graber, **R. Al abdi,** R.L. Barbour, “Additive step artifact correction (ASAC) algorithm”, Signal Processing in Medicine and Biology Symposium (SPMB), 2014 IEEE, Philadelphia, USA (Dec. 2014).
5. R.L. Barbour, **R. Al abdi**, Y. Xu, and H.L. Graber, "Phenotype-Motivated Strategies for Optical Detection of Breast Cancer," Poster Su P6.12 at fNIRS 2014 (Montréal, Québec, Canada, October 10-12, 2014).
6. **R. Al abdi**, H.L. Graber, C.H. Schmitz, and R.L. Barbour, "Enhancement of Hemodynamic Contrast in the Cancerous Breast by Controlled Articulation," Poster 88 at Functional Near Infrared Spectroscopy (London, UK, October 26-28, 2012).

7. **R. Al abdi**, H.L. Graber, C.H. Schmitz, and R.L. Barbour, "Enhancement of Hemodynamic Contrast in the Cancerous Breast by Carbogen Inspiration," Poster 37 at Functional Near Infrared Spectroscopy (London, UK, October 26-28, 2012).
8. **R. Al abdi**, H.L. Graber, and R.L. Barbour, "Carbogen Inspiration Enhances Hemodynamic Contrast in the Cancerous Breast," Poster BSu3A.94 at Biomedical Optics and Digital Holography and Three-Dimensional Imaging (Miami, FL, April 29 - May 2, 2012).
9. **R. Al abdi**, G. Feuer, H.L. Graber, S. Saha, and R.L. Barbour, "Optomechanical Imaging: Biomechanic and Hemodynamic Responses of the Breast to Controlled Articulation," Poster BSu3A.92 at Biomedical Optics and Digital Holography and Three-Dimensional Imaging (Miami, FL, April 29 - May 2, 2012).
10. **R. Al abdi**, H.L. Graber, Y. Xu, and R.L. Barbour, "Breast Cancer Detection by Optomechanical Imaging," Poster BSu3A.91 at Biomedical Optics and Digital Holography and Three-Dimensional Imaging (Miami, FL, April 29 - May 2, 2012).
11. ML Flexman, MA Khalil, **R. Al Abdi**, B Reig, CJ Fong, D Hershman, Elise Desperito, Randall L Barbour, Andreas H Hielscher, “Optical tomographic imaging of the hemodynamic response to a breath hold in breast cancer patients” Optical Tomography and Spectroscopy of Tissue IX 7896, 78962J (2011).
12. **R. Al Abdi,** C.H. Schmitz, R. Ansari, R. Andronica, Y. Xu, H.L. Graber, and R.L. Barbour, "A robotic, dual-sensing, functional optical imaging system for breast cancer detection," Poster ABS-170 at the 36th Annual Northeast Bioengineering Conference (New York, NY, March 26-28, 2010).
13. **R. Al Abdi**, C.H. Schmitz, R. Ansari, R. Andronica, Y. Pei, Y. Xu, H.L. Graber, Z. Bo, B. Noor, M. Ahluwalia, and R.L. Barbour, "A dual-mode simultaneous bilateral optical imaging system for breast cancer detection," Presentation BSuB5 at Biomedical Optics (BIOMED) Topical Meeting and Tabletop Exhibit (Miami Beach, FL, April 11-14, 2010).
14. **R. Al Abdi,** C.H. Schmitz, R. Ansari, R. Andronica, Y. Xu, H.L. Graber, and R.L. Barbour, "A robotic, dual-sensing, functional optical imaging system for breast cancer detection," Paper NIH01-100 at The Inter-Institute Workshop on Optical Diagnostic and Biophotonic Methods from Bench to Bedside (Bethesda, MD, October 1-2, 2009).