Anas Zainul Abidin

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EDUCATION

Ph.D. in **Biomedical Engineering**, Medical Image Analysis — August 2013 - Present
Hajim School of Engineering and Applied Sciences at University of Rochester, Rochester, NY
Thesis: A computational framework for development of imaging-derived biomarkers for HIV Associated Neurocognitive Disorders using functional-MRI — Advisor: Dr. Axel Wismüller

Masters in Science in **Biomedical Engineering** — August 2013 – April 2015
Hajim School of Engineering and Applied Sciences at University of Rochester, Rochester, NY

Bachelors of Engineering in **Biomedical Engineering** — August 2006 - June 2010
Manipal Institute of Technology, Manipal, India

SELECTED RESEARCH PROJECTS

- Developed a *mathematical framework* for non-linear functional brain connectivity estimation from image time-series (resting state fMRI) data.
- Developed and optimized software for *graph theoretic* and *statistical analysis of network data*.
- Developed tools for patellar cartilage *characterization* from phase contrast X-ray computed tomography images and subsequent *machine learning* and *classification*.
- Developed a system for *classification* of solitary brain tumors through *radiomic profiling*.
- Designed and implemented the *working prototype* of a low cost electrical stimulator for paraplegic muscles. System was tested on human subjects in collaboration with the Dept. of Physical Therapy in Kasturba Medical College, Manipal, India.

WORK EXPERIENCE

Philips Electronics India Ltd. - Field Service Engineer — September 2010 - April 2013

- Radiology Imaging Systems Engineer with specialization in Magnetic Resonance Imaging (MRI)
- Lead Engineer for installation of 5 MRI systems
- Delivered customer support, breakdown management, planned maintenance, and helium fillings for 22 MRI systems
- Technical Training in MRI Systems ACHIEVA R2/3, Part 1 at SLC, Singapore

Manipal Hospital, India - Biomedical Engineering Trainee — June - July 2009

- Worked as a part of biomedical engineering team at the hospital. Provided support in repair and maintenance of various medical devices ranging from bedside patient monitors to anesthesia, dialysis and X-ray machines

PUBLICATIONS

Journals

- **Abidin AZ**, DSouza AM, Nagarajan MB, Qiu X, Schifitto G, Wismüller A. Alteration of brain network topology in HIV-associated neurocognitive disorder: A novel functional connectivity perspective. NeuroImage: Clinical. 2018;17:768-77.
- **Abidin AZ**, Deng B, DSouza AM, Nagarajan MB, Coan P, Wismüller A. Deep transfer learning for characterizing chondrocyte patterns in phase contrast X-Ray computed tomography images of the human patellar cartilage. Computers in biology and medicine. 2018;95:24-33.
- DSouza AM, **Abidin, AZ**, Chockanathan U., Schifitto G., & Wismüller A. (2018). Mutual connectivity analysis of resting-state functional MRI data with local models. NeuroImage. 2018; 178:210-223.
- DSouza AM, **Abidin AZ**, Leistritz L, Wismueller A. Exploring connectivity with large-scale Granger causality on resting-state functional MRI. Journal of neuroscience methods. 2017;287:68-79.
- Agarwal S, **Abidin AZ**, Chattopadhyay S, Acharya UR. Engineering Interventions to Improve Impaired Gait: A Review. Advances in Therapeutic Engineering. 2012:335.

Peer-Reviewed Conferences

- **Abidin AZ,** D'Souza AM, Chockanathan U, Schifitto G, Wismüller A. Investigating directed functional connectivity between the resting state networks of the human brain using mutual connectivity analysis. Medical Imaging 2018: Biomedical Applications in Molecular, Structural, and Functional Imaging; 2018: International Society for Optics and Photonics.
- **Abidin AZ**, Jameson J, Molthen R, Wismüller A. Classification of micro-CT images using 3D characterization of bone canal patterns in human osteogenesis imperfecta. Medical Imaging 2017: Computer-Aided Diagnosis; 2017: International Society for Optics and Photonics.
- **Abidin AZ**, Chockanathan U, DSouza AM, Inglese M, Wismüller A. Using large-scale Granger causality to study changes in brain network properties in the Clinically Isolated Syndrome (CIS) stage of multiple sclerosis. Medical Imaging 2017:

Biomedical Applications in Molecular, Structural, and Functional Imaging; 2017: International Society for Optics and Photonics.

- **Abidin AZ**, D'Souza AM, Nagarajan MB, Wismüller A. Detecting Altered connectivity patterns in HIV associated neurocognitive impairment using Mutual Connectivity Analysis. Medical Imaging 2016: Biomedical Applications in Molecular, Structural, and Functional Imaging; 2016: International Society for Optics and Photonics.
- **Abidin AZ**, D'Souza AM, Nagarajan MB, Wismüller A. Investigating changes in brain network properties in HIV-associated neurocognitive disease (HAND) using mutual connectivity analysis (MCA). Medical Imaging 2016: Biomedical Applications in Molecular, Structural, and Functional Imaging; 2016: International Society for Optics and Photonics.
- **Abidin AZ**, Nagarajan MB, Checefsky WA, Coan P, Diemoz PC, Hobbs SK, et al.. Volumetric characterization of human patellar cartilage matrix on phase contrast x-ray computed tomography. Medical Imaging 2015: Biomedical Applications in Molecular, Structural, and Functional Imaging; 2015: International Society for Optics and Photonics.
- **Abidin AZ**, Agarwal S, Chattopadhyay S, Poddar A, Ganesh B. A study on portable functional electrical device for small muscles. Students' Technology Symposium (TechSym), 2010 IEEE; 2010: IEEE.
- Wang X, Nagarajan MB, **Abidin AZ**, DSouza A, Hobbs SK, Wismüller A. Investigating the use of mutual information and non-metric clustering for functional connectivity analysis on resting-state functional MRI. Medical Imaging 2015: Biomedical Applications in Molecular, Structural, and Functional Imaging; 2015: International Society for Optics and Photonics.
- Wismüller A, **Abidin AZ**, DSouza AM, Nagarajan MB. Mutual connectivity analysis (MCA) for nonlinear functional connectivity network recovery in the human brain using convergent cross-mapping and non-metric clustering. Advances in Self-Organizing Maps and Learning Vector Quantization: Springer, Cham; 2016. p. 217-26.
- Chen L, Wu Y, DSouza AM, **Abidin AZ**, Wismüller A, Xu C. MRI tumor segmentation with densely connected 3D CNN. Medical Imaging 2018: Image Processing; 2018: International Society for Optics and Photonics.
- D'Souza AM, **Abidin AZ**, Nagarajan MB, Wismüller A. Mutual connectivity analysis (MCA) using generalized radial basis function neural networks for nonlinear functional connectivity network recovery in resting-state functional MRI. Medical Imaging 2016: Biomedical Applications in Molecular, Structural, and Functional Imaging; 2016: International Society for Optics and Photonics.
- DSouza AM, **Abidin AZ**, Chockanathan U, Wismüller A. Regional autonomy changes in resting-state functional MRI in patients with HIV associated neurocognitive disorder. Medical Imaging 2018: Image Processing; 2018: International Society for Optics and Photonics.
- Chockanathan U, DSouza AM, **Abidin AZ**, Schifitto G, Wismüller A. Identification and functional characterization of HIV-associated neurocognitive disorders with large-scale Granger causality analysis on resting-state functional MRI. Medical Imaging 2018: Computer-Aided Diagnosis; 2018: International Society for Optics and Photonics.
- DSouza AM, **Abidin AZ**, Wismüller A. Investigating changes in resting-state connectivity from functional MRI data in patients with HIV associated neurocognitive disorder using MCA and machine learning. Medical Imaging 2017: Biomedical Applications in Molecular, Structural, and Functional Imaging; 2017: International Society for Optics and Photonics.
- DSouza AM, **Abidin AZ**, Leistritz L, Wismüller A. Identifying HIV associated neurocognitive disorder using large-scale Granger causality analysis on resting-state functional MRI. Medical Imaging 2017: Image Processing; 2017: International Society for Optics and Photonics.
- Deng B, **Abidin AZ**, D'Souza AM, Nagarajan MB, Coan P, Wismüller A. Characterizing cartilage microarchitecture on phase-contrast x-ray computed tomography using deep learning with convolutional neural networks. Medical Imaging 2017: Computer-Aided Diagnosis; 2017: International Society for Optics and Photonics.
- Checefsky WA, **Abidin AZ**, Nagarajan MB, Bauer JS, Baum T, Wismüller A. Assessing vertebral fracture risk on volumetric quantitative computed tomography by geometric characterization of trabecular bone structure. Medical Imaging 2016: Computer-Aided Diagnosis; 2016: International Society for Optics and Photonics.
- Wismüller A, **Abidin AZ**, D'Souza AM, Wang X, Hobbs SK, Leistritz L, et al.. Nonlinear functional connectivity network recovery in the human brain with mutual connectivity analysis (MCA): convergent cross-mapping and non-metric clustering. Medical Imaging 2015: Biomedical Applications in Molecular, Structural, and Functional Imaging; 2015: International Society for Optics and Photonics.
- Nagarajan MB, Checefsky WA, **Abidin AZ**, Tsai H, Wang X, Hobbs SK, et al.. Characterizing trabecular bone structure for assessing vertebral fracture risk on volumetric quantitative computed tomography. Medical Imaging 2015: Biomedical Applications in Molecular, Structural, and Functional Imaging; 2015: International Society for Optics and Photonics.

HONOURS AND AWARDS

- **Best Poster Award** - Honorable mention, Biomedical, Structural and Functional Imaging, SPIE Medical Imaging 2015
  - Investigating the use of mutual information and non-metric clustering for functional connectivity analysis on resting-state functional MRI.

- **Best Teaching Assistant Award**, Department of Biomedical Engineering, for outstanding contribution in teaching as a Graduate Student 2014-2015
- **Best Poster Award** at World AIDS Day Scientific Symposium 2017 organized by Centre for AIDS Research at the University of Rochester, NY, USA
  - Alteration of brain network topology in HIV-associated neurocognitive disorder: A novel connectivity perspective.
- **Winner**, Annual RocHackHealth Hackathon for developing a system to predict re-admissions of patients to the hospital within 30 days after discharge using medical records data, held at University of Rochester, April '16.
- **Rochester Center for Brain Imaging Pilot Award** (up to 10,000 USD) – awarded to team for the study of connectivity of the amygdala via the analysis of neuroimaging and anatomic tract tracing data obtained from non-human primates.
- **Finalist**, Three Minute Thesis (2016) inaugural competition at University of Rochester, Rochester, NY.
- Participant, Falling Walls Competition (2016 & 2017) at University of Rochester, Rochester, NY.
- University level travel grants for participating in Conference(s).
- **Multiple awards** (SPOT, YCC) for outstanding contribution during tenure at Philips Electronics India Ltd.

RELEVANT COURSEWORK

• Computer Vision • Machine Learning • Digital Image Processing • Medical Imaging - Theory and Implementation
• Digital Signal Processing • Foundation of Cell and Molecular Biology • Cancer Biology • BME Proposal and Grant Writing

LEADERSHIP AND ENTERPRENEURIAL EXPERIENCE

- Semifinalist in the Neuro Startup Challenge organized by The Center for Advancing Innovation – developed business and marketing plan for a device which can be used for prospective correction of motion artifacts during MR scanning
- Member, Biomedical Engineering Graduate Student Council, organizing various student centric events throughout the academic year 2014-2015.
- Organizing team, BMESI (Biomedical Engineering Society of India) National Meeting 2007, at Manipal Institue of Technology.
- Served as Team Lead/Representative at various levels throughout academic and professional career

RESEARCH SUPERVISION

- Walter Checefsky - MS Electrical and Computer Engineering – September 2014 to February 2016
  - Project Title: Detecting the incidence of Clinically Isolated Syndrome (CIS) using functional connectivity analysis, graph theory and machine learning.
- Botao Deng - MS Electrical and Computer Engineering – May 2016 to May 2017
  - Deep Transfer Learning for Characterizing Chondrocyte Patterns in Phase Contrast X-Ray Computed Tomography Images of the Human Patellar Cartilage
- Uday Chockanathan – Biophysics and Biochemistry – May 2016 – December 2017
  - Functional characterization of HIV-associated neurocognitive disorders using Granger causality analyses on resting-state functional MRI
- Hyeon Woo Lee - BS Biomedical Engineering – May 2017 to December 2017
  - Automated segmentation of brain tumors in multi-modal MR images

TEACHING EXPERIENCE

- Teaching Assistant – BME 502 – Analytic Foundations in BME (Graduate Course)
- Teaching Assistant – BME 221 – Biomedical Computation and Statistics (Undergraduate Course)

TECHNICAL SKILLS AND INTERESTS

- MATLAB, Python (NumPy, SciPy, scikit-learn, Pandas), LabVIEW, Shell-scripting (Beginner)
- MR Imaging, Deep Learning, Machine Learning, Image & Signal Processing, Graph Theory, Statistical Analysis
- Languages: English, Urdu, Hindi, Arabic

INVITED TALKS

At University of Rochester: Invited by Dr. Kevin Parker for latest frontiers section of course ECE452 (Medical Imaging). Talk was titled "Computer Aided Diagnostics – A functional imaging perspective" December 2018.

PROFESSIONAL SERVICES

Reviewer – Medical Image Analysis, Neuroimage-Clinical, Magnetic Resonance Imaging, SPIE Journal of Medical Imaging, Proceedings of the National Academy of Sciences