Curriculum Vitae

Name: Mahmood Akhtar, *PhD*
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Current Position: Assistant Professor (Computer Engineering) at NUST, Pakistan
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HEC (Approved PhD Supervisor) Profile: http://sc.hec.gov.pk/aphds/submit.asp?supid=5247
NUST Profile: http://www.nust.edu.pk/INSTITUTIONS/Colleges/CEME/Departments/CE/Faculty/Pages/Dr.-Mahmood--Akhtar.aspx
Google Scholar: http://scholar.google.com/citations?user=BnP_F5YAAAAJ&hl=en

Research Interests

- Biomedical Imaging & Image Processing
- Biomedical Signal Processing
- Bioinformatics and Computational Biology
- Public Health Biosurveillance
- Modelling, Optimisation and Visualisation

Education

PhD Electrical Engineering (2004 – 2008)
The University of New South Wales (UNSW), Australia

- Thesis entitled "GENOMIC SEQUENCE PROCESSING: Gene Finding in Eukaryotes" firstly develops efficient digital signal processing-based methods for the identification of genomic protein coding regions, and then combines the optimum signal processing-based non-data-driven technique with an existing data-driven statistical method in a novel system demonstrating improved identification of acceptor splice sites. The proposed DSP-statistical hybrid is shown to achieve 43% reduction in false positives over WWAM, as used in GENSCAN.
- My article entitled "Signal Processing in Sequence Analysis: Advances in Eukaryotic Gene Prediction" published in the "IEEE Journal of Selected Topics in Signal Processing, Special Issue on Genomic and Proteomic Signal Processing (Journal Impact Factor: 3.63)" has been well-recognized by the research community (receiving nearly 100 citations)

MS Computer Engineering (2003 – 2005)
The National University of Sciences and Technology (NUST), Pakistan

- Winner of MS leading to PhD (Endowment Fund) scholarship offered by NUST. The scholarship was awarded to top 40 students. More than 2500 students appeared in a GRE-style entrance test.
- Course work passed with a Cumulative Grade Point Average (CGPA) 4.0 out of 4.0
- Ranked 1st in class of 20 students
- Winner of the foreign PhD scholarship offered by NUST, Pakistan.

Bachelors of Science (Hons) in Electrical Engineering (1999 – 2003)
University of Engineering and Technology (UET) Lahore, Pakistan

- Ranked 8th in a class of 250 Electrical Engineering students
- Degree completed with honors (overall percentage marks: 80.74%).
- Recipient of UET merit scholarship.

Employment History

National University of Sciences and Technology, Pakistan

Assistant Professor in Computer Engineering (February 2012 to date)

I am currently an Assistant Professor in Computer Engineering at the National University of Sciences and Technology (NUST) Islamabad, Pakistan. The department of Computer Engineering at NUST is perhaps the first department in Pakistan which offers the Washington Accord's accredited Bachelors of Science in Computer Engineering program. I have been teaching and supervising in their research both the undergraduate and postgraduate level students. I have taught the following courses:

- EC-803 Computer Vision (postgraduate students— Summer 2012, Fall 2012, Spring 2014, Spring 2015)
- EC-835 Digital Image Processing (postgraduate students— Fall 2013)
- EC-332 Computer Graphics (undergraduate students— Spring 2013)
- EC-301 Computer Graphics (undergraduate students— Spring 2014, Fall 2014)

NUST Online Profile:
http://www.nust.edu.pk/INSTITUTIONS/Colleges/CEME/Departments/CE/Faculty/Pages/Dr.-Mahmood--Akhtar.aspx

The University of Sydney, Australia

Postdoctoral Research Fellow in Medical Imaging (February 2009 – January 2012)

I won the prestigious faculty postdoctoral fellowship at the University of Sydney, Australia. I was employed with the Faculty of Health Sciences at the Brain and Mind Research Institute (BMRI) to undertake research as part of an ongoing ARC-funded project to develop novel imaging technology. The major contribution of my work was in the area of investigation of challenges in reconstructing positron emission tomography (PET) images of freely moving small animals. My article published in "Australasian Physical and Engineering Science in Medicine: (2013) 36:405–415" has been voted the winner of the **2014 Kenneth Clarke Award** for best paper published in 2013.

The University of New South Wales, Australia

Research Associate in Public Health Bio-Surveillance (February 2008 – January 2009)

After submission of my PhD thesis, I was offered the position of Research Associate at the Center for Health Informatics (CHI), UNSW, to work on an ongoing project on biosurveillance for early detection of infectious disease outbreaks. My duties at CHI included: designing and performing simulation-based studies, processing and analyzing the experimental data, writing research reports, and contributing to the activities of the research group through meetings and group discussions.

The University of New South Wales, Australia

Tutor / Lab Demonstrator in Elect Engg & Telecoms (February 2006 – December 2007)

I worked as a tutor and/or lab demonstrator at the School of Electrical Engineering and Telecommunications, UNSW, for the following undergraduate courses.

- Lab Demonstrator: ELEC3004 Signal Processing and Transform Methods (S 1, 2006)
- Tutor: ELEC1111 Electrical and Telecommunication Engineering (S 2, 2006)
- Tutor: ELEC1111 Electrical and Telecommunication Engineering (S 1, 2007)
- Tutor: ELEC1111 Electrical and Telecommunication Engineering (S 2, 2007)

Achievements, Awards & Professional Honors

- Elevated to the IEEE Senior Member Grade (February 2015)
- Winner of the **2014 Kenneth Clarke Award** for best APESM paper published in 2013 (Australasian College of Physical Scientists & Engineers in Medicine)
- Member of team awarded "Siemens Preclinical Research in PET, SPECT, CT, Multimodal Imaging: **High Performance Image of the Year Award**, 2009", at WMIC (Montreal, Canada), September 23–26, 2009
- Awarded the prestigious **Faculty Postdoctoral Fellowship** (2009-2012), at the University of Sydney, Australia
- Awarded the **school of EE&T scholarship** (covering full tuition fee for 3rd & 4th years of doctoral study), at the University of New South Wales, Australia
- Awarded **NUST split MS leading to PhD abroad scholarship** for PhD at the University of New South Wales, Australia (covering full tuition fee for 1st & 2nd years of doctoral study)
- Ranked **1st** in MS Computer Engineering class (with **Cum. GPA 4.0 out of 4.0**), at the National University of Sciences & Technology (NUST), Pakistan
- Won **NUST MS leading to PhD Endowment Fund Scholarship** in GRE style postgraduate entrance examination conducted by NUST, Pakistan
- Ranked **8th** in B.Sc (Hons) Electrical Engineering class of 250 students, at the University of Engineering and Technology (UET, Lahore), Pakistan
- Recipient of **UET merit scholarship**.

Skills and Experience

- 2.5+ years postdoctoral research & teaching experience at NUST, Pakistan
- 3 years postdoctoral research experience at University of Sydney, Australia
- 1 years postdoctoral research experience at UNSW, Australia
- 2 years lab demonstration and tutoring experience at School of EE&T, UNSW, Australia
- Computing skills (e.g. Matlab, IDL, JAVA, C++, OpenGL, OpenCV, Verilog HDL, Assembly language, etc)

Courses and Learning

- MATLAB and Simulink in Education Workshop (one day), University of Sydney (Australia), July, 2009
- Animal Handling Workshop (one day), University of Sydney (Australia) July, 2009
- Image Reconstruction course (one day) IEEE MIC-NSS (Orlando, USA), October 2009
- Radiation Safety for Laboratory Workers course (one day), University of Sydney (Australia), February 2011

Professional Activities

Reviewer:

- IEEE/ACM Transactions on Computational Biology and Bioinformatics
- EURASIP Journal on Bioinformatics and System Biology
- Int. J. of Computational Biology and Drug Design
- IEEE Transactions on Signal Processing

- IEEE Transactions on Nuclear Sciences
- Australasian Physical & Engineering Sciences in Medicine (Journal)
- International Journal Of Biomedical Engineering
- IEEE Journal of Selected Topics in Signal Processing
- International Journal of Modeling, Simulation, and Scientific Computing
- Pattern Recognition (Journal)
- IEEE International Workshop on Genomic Signal Processing and Statistics

Member:

- Senior Member IEEE & IEEE Nuclear & Plasma Sciences Society, USA
- ARC Communications Research Network (ACoRN) Australia,
- Pakistan Engineering Council (PEC)
- International Association of Engineers (IAENG)

Conferences / Workshops Presented:

- ICIC 2005 (China)
- IEEE ICET 2005 (Pakistan)
- IEEE ICIES 2006 (France)
- IEEE ICEST 2007 (Pakistan)
- IEEE DSP 2007 (UK)
- IEEE ICASSP 2007 (USA)
- IEEE ICASSP 2008 (USA)
- IEEE GENSIPS 2008 (USA)
- HIC 2009 (Australia)
- IEEE NSS-MIC 2010 (USA)
- IEEE NSS-MIC 2011 (Spain)

Other Conferences & Workshops Attended:

- IEEE International Networking and Communication Conference, Lahore, Pakistan, 13 June 2004
- NSW Bioinformatics Research Symposium, Sydney, Australia, 10 September, 2009
- IEEE Nuclear Science Symposium and Medical Imaging Conference, (Orlando, Florida, USA), 25–31 October, 2009
- The Inaugural Sydney International Workshop on Synergies in Astronomy and Medicine (AstroMed09), Sydney, Australia, 14-16 December, 2009
- Molecular Imaging Workshop, BMRI, University of University of Sydney, Australia, 24 August, 2011
- IEEE Nuclear Science Symposium and Medical Imaging Conference, (Valencia, Spain), 23–29 October, 2011

Session Chair:

- International Conference on Intelligent Computing (Hefei, China), August 23–26, 2005

Research Publications

Thesis:

[1] Mahmood Akhtar (2008), "Genomic sequence processing: gene finding in eukaryotes," *Ph.D. thesis, University of New South Wales, School of Electrical Engineering & Telecommunications*, Sydney, Australia.

Refereed Journal Articles:

[1] Mahmood Akhtar, Andre Kyme, Victor Zhou, Roger Fulton and Steven Meikle (2013), "An investigation of the challenges in reconstructing PET images of a freely moving animal" *Australas Phys Eng Sci Med*, vol. 36, no. 4, pp 405–415. [Winner of the **2014 Kenneth Clarke Award** for the best paper in 2013]

[2] Victor Zhou, John Eisenhuth, Andre Kyme, **Mahmood Akhtar**, Roger Fulton, and Steven Meikle (2013), "A Motion Adaptive Animal Chamber for PET Imaging of Freely Moving Animals" *IEEE Transactions on Nuclear Science*, vol. 60, no. 5, pp 3423–3431.

[3] Mahmood Akhtar, Julien Epps, and Eliathamby Ambikairajah (2008), "Signal processing in sequence analysis: advances in eukaryotic gene prediction," *IEEE Journal of Selected Topics in Signal Processing, Special Issue on Genomic and Proteomic Signal Processing*, vol. 2, no. 3, pp 310–321. **[95 Citations]**

[4] Mahmood Akhtar (2005), "Comparison of gene and exon prediction techniques for detection of short coding regions," *International Journal of Information Technology, Special Issue on Bioinformatics and Biomedical Systems*, vol. 11, no. 8, pp 26–35.

Book Chapters:

[1] M Usman Akram, **Mahmood Akhtar**, and M Younus Javed (2012), "An automated system for the grading of diabetic maculopathy in fundus images," *Book chapter: Neural Information Processing, Lecture Notes in Computer Science, T. Huang et al., Eds.*, vol. 6666. Berlin: Springer–Verlag, pp. 36–43.

[2] Mahmood Akhtar, Eliathamby Ambikairajah, and Julien Epps (2008), "Digital signal processing techniques for gene finding in Eukaryotes," *Book chapter: Image and Signal Processing, Lecture Notes in Computer Science, A. Elmoataz et al.*, Eds., vol. 5099. Berlin: Springer–Verlag, pp. 144–152.

Conference Proceedings:

[1] Andre Kyme, John Eisenhuth, Georgios Angelis, Roger Fulton, Victor Zhou, Kata Popovic, Kelly Clemens, Arvind Parmar, **Mahmood Akhtar**, Giancarlo Pascali, Genevra Hart, and Steven Meikle (2015), "Open field PET: A system for simultaneous brain PET and behavioural response measurements in freely moving rats," (Accepted for Oral Presentation): *XIIth International Conference on Quantification of Brain Function with PET, June 27th* – 30th 2015, Vancouver, Canada.

[2] Mahmood Akhtar, Andre Z. Kyme, Roger R. Fulton, and Steven Meikle (2011), "Investigation of quantitative errors due to LOR rebinning motion correction for freely moving small animals with microPET" *IEEE Nuclear Science Symposium and Medical Imaging Conference* (Valencia, Spain), pp 3800-3803.

[3] Mahmood Akhtar, Andre Kyme, Victor Zhou, Roger Fulton, Wencke Lehnert, Wesley Ng Ping Man, and Steven Meikle (2010), "Investigation of motion-corrected VOI reconstruction for freely moving small animals with microPET," *IEEE Nuclear Science Symposium and Medical Imaging Conference* (Knoxville, Tennessee, USA), October 30– November 06.

[4] Victor Zhou, Andre Kyme, John Eisenhuth, **Mahmood Akhtar**, Roger Fulton, and Steven Meikle (2010), "A motion adaptive animal chamber for PET imaging of freely moving animals," *IEEE Nuclear Science Symposium and Medical Imaging Conference* (Knoxville, Tennessee, USA), October 30– November 06.

[5] Roger Fulton, Steven Meikle, Andre Kyme, Victor Zhou, **Mahmood Akhtar**, Michael Kassiou, Kata Popovic, and Inga Karlsson (2009), "Imaging the awake rat brain with microPET, head tracking and motion correction," *5th International Conference on Imaging Technologies in Biomedical Sciences* (Milos Island, Greece), September 13–16.

[6] Roger Fulton, Steven Meikle, Andre Kyme, Victor Zhou, Kata Popovic, Michael Kassiou, and **Mahmood Akhtar** (2009), "Motion-corrected microPET brain imaging of conscious rats," *World Molecular Imaging Conference* (Montreal, Canada), September 23–26.

[7] Andre Kyme, Victor Zhou, Steven Meikle, Kata Popovic, **Mahmood Akhtar,** and Roger Fulton (2009), "Motion tracking of fully conscious small animals in PET," *IEEE Nuclear Science Symposium and Medical Imaging Conference* (Orlando, Florida, USA), October 25–31.

[8] Mahmood Akhtar, Blanca Gallego, Andy Yi-Chih Shiue, and Vitali Sintchenko (2009), "Prospective biosurveillance for early detection of disease outbreaks," *Health Informatics Conference* (Canberra, Australia), August 19–21.

[9] Julien Epps, Eliathamby Ambikairajah, and **Mahmood Akhtar** (2008), "An integer period DFT for biological sequence processing," in *Proc. IEEE 6th International Workshop on Genomic Signal Processing and Statistics* (Phoenix, Arizona, USA), June 8–10.

[10] Mahmood Akhtar, Eliathamby Ambikairajah, and Julien Epps (2008), "Optimizing period-3 methods for eukaryotic gene prediction," in *Proc. IEEE 33rd International Conference on Acoustics, Speech, and Signal Processing* (Las Vegas, Nevada, USA), March 30 – April 04, pp. 621–624.

[11] Mahmood Akhtar, Eliathamby Ambikairajah, and Julien Epps (2007), "Comprehensive autoregressive modeling for classification of genomic sequences," in *Proc. IEEE 6th International Conference on Information, Communications and Signal Processing* (Singapore), December 10–13.

[12] Mahmood Akhtar, Julien Epps, and Eliathamby Ambikairajah (2007), "Paired spectral content measure for gene and exon prediction in eukaryotes," *IEEE International Conference on Information and Emerging Technologies* (Karachi, Pakistan), July 6–7, pp. 127–130.

[13] Mahmood Akhtar, Eliathamby Ambikairajah, and Julien Epps (2007), "GMM–based classification of genomic sequences," *IEEE 15th International Conference on Digital Signal Processing* (Cardiff, UK), July 1–4, pp. 103–106.

[14] Mahmood Akhtar, Julien Epps, and Eliathamby Ambikairajah (2007), "On DNA numerical representations for period-3 based exon prediction," in *Proc. IEEE 5th International Workshop on Genomic Signal Processing and Statistics* (Tuusula, Finland), June 10–12.

[15] Mahmood Akhtar, Julien Epps, and Eliathamby Ambikairajah (2007), "Time and frequency domain methods for gene and exon prediction in eukaryotes," *IEEE 32nd International Conference on Acoustics, Speech, and Signal Processing* (Hawaii, USA), April 15–20, pp. 573–576.

[16] Mahmood Akhtar, Eliathamby Ambikairajah, and Julien Epps (2006), "A hybrid method for the recognition of acceptor splice sites," *IEEE 13th International Conference on Electronics, Circuits and Systems* (Nice, France), December 10–13, pp. 565–568.

[17] Mahmood Akhtar, Eliathamby Ambikairajah, and Julien Epps (2005), "Detection of period-3 behavior in genomic sequences using singular value decomposition," *IEEE International Conference on Emerging Technologies* (Islamabad, Pakistan), September 17–18, pp. 13–17.

[18] Eliathamby Ambikairajah, Julien Epps, and **Mahmood Akhtar** (2005), "Gene and exon prediction using time domain algorithms," *IEEE 8th International Symposium on Signal Processing and its Applications* (Sydney, Australia), August 28–31, pp. 199–202.

[19] Mahmood Akhtar, Eliathamby Ambikairajah, and Julien Epps (2005), "Comparison of gene and exon prediction techniques for detection of short coding regions," *International Conference on Intelligent Computing* (Hefei, China), August 23–26, pp. 1361–1370.

[20] Mahmood Akhtar, Eliathamby Ambikairajah, and Julien Epps (2005), "Gene and exon prediction using time-domain techniques," *3rd Asia Pacific Bioinformatics Conference* (Singapore), January 17–21, p. 43.

[21] Javed Akhtar, Muhammad Younus Javed, and **Mahmood Akhtar** (2004), "Implementation and analysis of wavelet image decomposition and SPIHT algorithm," *IEEE 8th International Multi-topic Conference* (Lahore, Pakistan), December 24–26, pp. 97–101.