

Research Scientist

EXPERTISE & RESEARCH INTERESTS

Low Density Parity-Check (LDPC), Bit Error Rate (BER), Additive White Gaussian Noise (AWGN), Field Programmable Gate Array (FPGA), Hardware Description Language (HDL), Linux Cluster, Embedded Linux, Thermal Imaging, TI OMAP3/OMAP4, Arduino, Nuvoton NUC140 Raspberry PI, Camera module, Arduino, GCC/toolchain Bitbake, ARM-NEON, Qt-embedded/Qt4.8/Qt5/QML, MATLAB, C/C++, JAVA, MySQL, DSP assembler, OpenCV, OpenGL ES, OpenGL Shading Language (GLSL), Bluetooth, GStreamer, DSP Plugin, Wifi, Ethernet, Giga-Ethernet, IP Video streaming, Wiimote, Nunchuck, Kinect, GPS, I2C, SPI, Infrared LWIR/SWIR, Signal Processing, MIDI, Pro Audio, biomedical, ElectroEncephalography, biomarkers, Alzheimer Disease, Brain-Computer Interface (BCI), Machine Learning (ML), Pattern Recognition (PR), Attention-Deficit Hyperactivity Disorder (ADHD), stroke rehabilitation, Receiver Operating Characteristics (ROC), Statistical Parametric Mapping (SPM), functional Magnetic Resonance Imaging (fMRI), Graphics Processing Unit (GPU), Compute Unified Device Architecture (CUDA), Graph Theory (GT), Fractal Dimension (FD), sound analysis, sound synthesis, sound modeling, Perceptual Evaluation of Audio Quality (PEAQ), Particle Swarm Optimization (PSO, Genetic Algorithm (GA), Harmony Search (HS), Near Infrared Spectroscopy (NIRS), etc.

WORK EXPERIENCE

October 2014 Research Scientist II

Present:

Data Storage Institute, Division Drive Systems and Technologies (DST)
5 Engineering Drive 1, Singapore 117608

Research and Development on Joint Viterbi Detector Decoder (JVDD) for satellite communications, Additive White Gaussian Noise (AWGN), Low Density Parity-Check (LDPC), Bit Error Rate (BER), Xilinx Vivado ISE ZC706 FPGA / HDL, Large scale simulations Linux 64-cores R815

April 2012 Lead Software (R&D) Engineer

September 2014 MTech Imaging Pte Ltd, 57 Changi North Crescent, Singapore 499629

Research & Design in Thermal Imaging (LWIR, SWIR),
Linux Embedded Software, Camera Driver, Qt apps and GUI, Sensors,
Video IP Streaming, Image Processing (NUC, Enhancement, Tracking, etc),
Motorized Lens Control, Thermography Calibration and Profiling

August 2011 Research Fellow

March 2012: Marine Mammal Research Laboratory (MMRL), Tropical Marine Science Institute (TMSI)

National University of Singapore (NUS), Singapore

Underwater video processing, underwater ambient noise analysis, marine technologies

July 2010 Research Fellow

July 2011: Brain and Behaviour Laboratory, Department of Psychology, National University of Singapore

Co-Pi for research project on 'Brain correlates of behavioral learning in humans'

Head: Associate Professor Annett Schirmer

March 2007 Research Fellow

March 2010: Brain-Computer Interface Lab, Signal Processing Department, Institute for Infocomm Research (I²R)

Agency for Science, Technology and Research (A*STAR), Singapore

Signal processing for Audio and Biomedical, model optimization and performance evaluation

EEG, Brain-Computer Interface, ADHD, stroke rehabilitation, MRI/fMRI, Epilepsy

Nov. 2005 Research Fellow / Development of GRID and web services

Sept. 2006: Early detection of Alzheimer Disease from EEG (Bioprofiling over GRID for eHealthcare)

Preoperative diagnosis of ovarian tumors, and ROC-based evaluation of intelligent medical systems

European Network of Excellence BIOPATTERN (FP6-2002-IST-1 N° 508803)

- Nov. 2002** **Post-Doctoral Research Fellow**
Nov. 2005: Intelligent and perceptual-based techniques for automated design and synthesis of musical instrument sounds
Signal Processing and Multimedia Communications (SPMC) research group
School of Computing, Communications & Electronics (SoCCE), University of Plymouth
EPSRC funded project (Grant No. GR/S00859/01) (Value: £140,218)
- 1996 - 1997:** **French National Service as software/hardware engineer**
Visual C/C++ 6.0 development under Windows 95 at the CFO/Simulation.
Ecole d'Application de l'Arme Blindée de Cavalerie (E.E.A.B.C.), Saumur (49), France
Development of a digital radio network at Erco & Gener, Saumur, France

EDUCATION & QUALIFICATIONS

- December 2005** **Ph.D. in Audio Signal Processing and Computer Music**
School of Computing, Communications and Electronics (SoCCE), University of Plymouth, U.K.
Thesis title: **Artificial Intelligence-based Approach to Modeling of Pipe Organs**
Expertise in digital signal processing, sound synthesis and perceptual evaluation of audio quality, computational intelligence, MATLAB, C++, JAVA,
Supervisor: Professor Emmanuel C. Ifeakor
- July 1996:** **Master of Engineering in Information Engineering**
Bachelor of Engineering in Electronic Engineering (First Class Honours)
Department of Communication and Electronic Engineering, University of Plymouth, Devon, U.K.
Modules: Digital Signal Processing, Programmable Logic, Artificial Intelligence, Analogue and Digital Electronics, VLSI and Opto-electronics, Spanish, International Business and Marketing.

PUBLICATIONS

Updated list, PDF and preprints available at <http://www.tech.plymouth.ac.uk/spmc/brahim/>

Intelligent and Perceptual-based Approach to Musical Instruments Sound Design

B. Hamadicharef, E. C. Ifeakor

Expert Systems with Applications (IF: 1.924), Volume 39, Issue 7, June 2012, pp. 6476–6484

<http://dx.doi.org/10.1016/j.eswa.2011.12.058>

Scientometric Study of the IEEE Transactions on Software Engineering 1980-2010

B. Hamadicharef

Proceedings of the 2nd International Congress on Computer Applications and Computational Science (CACS2011), Bali, Indonesia, November 15-17, 2011

Bibliometric Analysis of Near-Infrared Spectroscopy (NIRS) Research 1995-2009

B. Hamadicharef

Proceedings of the 3rd International Conference on Intelligent Computing and Intelligent Systems (ICIS2011), Guangzhou, China, November 18-20, 2011

Bibliometric Analysis of Particle Swarm Optimization (PSO) Research 2000-2010

B. Hamadicharef

Proceedings of the 2011 International Conference on Artificial Intelligence and Computational Intelligence (AICI2011), Taiyuan, China, September 24-25, 2011 Lecture Notes in Computer Science (LNCS) series Volume 7004, pp: 404-411

http://dx.doi.org/10.1007/978-3-642-23896-3_50

International Collaborations in Brain-Computer Interface (BCI) Research

B. Hamadicharef

Proceedings of the 2011 International Conference on Web Information Systems and Mining (WISM'11), Taiyuan, China, September 24-25, 2011 Lecture Notes in Computer Science (LNCS) series Volume 6987, pp: 35-42

http://dx.doi.org/10.1007/978-3-642-23971-7_5

Scientometric Study of the Journal NeuroImage 1992-2009

B. Hamadicharef

Proceedings of the 2010 International Conference on Web Information Systems and Mining (WISM'10), Sanya, China, October 23-24, 2010, pp. 201-204

<http://dx.doi.org/10.1109/WISM.2010.166>

Brain-Computer interface (BCI) based Musical Composition

B. Hamadicharef, MuFeng Xu, Sheel Aditya

Proceedings of the 2010 International Conference on CYBERWORLDS (CW2010), Singapore, October 20-22, 2010, pp. 282-286

URL: <http://www.tech.plymouth.ac.uk/spmc/brahim/BCI-Music/> (Video)

<http://dx.doi.org/10.1109/CW.2010.32>

A Plea for AUC Confidence Intervals in Diagnosis Models used in Gynecology

B. Hamadicharef

Proceedings of the 3rd International Conference on BioMedical Engineering and Informatics (BMEI2010), Yantai, China, October 16-18, 2010, pp. 2471-2474

<http://dx.doi.org/10.1109/BMEI.2010.5639681>

AUC Confidence Bounds for Performance Evaluation of Brain-Computer Interface

B. Hamadicharef

Proceedings of the 3rd International Conference on BioMedical Engineering and Informatics (BMEI2010), Yantai, China, October 16-18, 2010, pp. 1988-1991

<http://dx.doi.org/10.1109/BMEI.2010.5639671>

Bibliometric Study of the DAFx Proceedings 1998-2009

B. Hamadicharef

Proceedings of the 13th International Conference on Digital Audio Effects (DAFx2010), Graz, Austria, September 6-10, 2010, pp. 427-430

URL: <http://www.tech.plymouth.ac.uk/spmc/brahim/DAFx2010/>

Brain-Computer Interface (BCI) Literature - A Bibliometric Study

B. Hamadicharef

Proceedings of the 10th International Conference on Information Science, Signal Processing and their applications (ISSPA2010), Kuala Lumpur, Malaysia, May 10-13, 2010, pp. 626-629

<http://dx.doi.org/10.1109/ISSPA.2010.5605421>

Frequentist versus Bayesian approaches for AUC Confidence Interval Bounds

B. Hamadicharef

Proceedings of the 10th International Conference on Information Science, Signal Processing and their applications (ISSPA2010), Kuala Lumpur, Malaysia, May 10-13, 2010, pp. 341-344

<http://dx.doi.org/10.1109/ISSPA.2010.5605530>

Learning EEG-based Spectral-Spatial Patterns for Attention Level Measurement

B. Hamadicharef, H.H. Zhang, C.T. Guan, C.C. Wang, K.S. Phua, K.P. Tee, K.K. Ang

Proceedings of the 2009 IEEE International Symposium on Circuits and Systems (ISCAS2009), Taipei, Taiwan, May 24-27, 2009, pp. 1465-1468

<http://dx.doi.org/10.1109/ISCAS.2009.5118043>

Performance Evaluation and Fusion of Methods for Early Detection of Alzheimer Disease

B. Hamadicharef, C.T. Guan, E. C. Ifeachor, N. Hudson, S. Wimalaratna

Proceedings of the International Conference on BioMedical Engineering and Informatics (BMEI2008), Sanya, Hainan, China, May 27-30, 2008

<http://dx.doi.org/10.1109/BMEI.2008.196>

Online tools and services for early detection and care of Alzheimer's disease

B. Hamadicharef, C. Goh, E. C. Ifeachor, C. Bigan, N. Hudson

Proceedings of the 3rd International Conference on Computational Intelligence in Medicine and Healthcare (CIMED2007), Plymouth, U.K., July 25-27, 2007

Sample Size Determination using ROC Analysis

V. Stalbovskaya, B. Hamadicharef, E. C. Ifeachor

Proceedings of the 3rd International Conference on Computational Intelligence in Medicine and Healthcare (CIMED2007), Plymouth, U.K., July 25-27, 2007

The BIOPATTERN Grid – Implementation and Applications

P. Hu, L. Sun, C. Goh, B. Hamadicharef, E. C. Ifeachor, I. Barbounakis, M. Zervakis, N. Nurminen, A. Varri, R. Fontanelli, S. Di Bona, D. Guerri, S. La Manna, K. Cerbioni, E. Palanca and A. Starita

Bioprofiling over Grid for eHealthcare

L. Sun, P. Hu, C. Goh, B. Hamadicharef, E. C. Ifeachor, I. Barbounakis, M. Zervakis, N. Nurminen, A. Varri, R. Fontanelli, S. Di Bona, D. Guerri, S. La Manna, K. Cerbioni, E. Palanca, A. Starita
Proceedings of HealthGRID2006, Valencia, Spain, June 7-9, 2006

Bioprofiling over Grid for Early Detection of Dementia (Invited Paper)

L. Sun, P. Hu, C. Goh, B. Hamadicharef, M. Hess, E. C. Ifeachor, I. Barbounakis, M. Zervakis, N. Nurminen, A. Varri
Proceedings of the 1st International Conference on Scalable Information Systems (INFOSCALE 2006), Hong Kong, May 30 - June 1, 2006

Preoperative Ovarian Cancer Diagnosis using Neuro-Fuzzy Approach

E. Madu, V. Stalbovskaya, B. Hamadicharef, E. C. Ifeachor, S. Van Huffel, D. Timmerman
Proceeding of the European Conference on Emergent Aspects on Clinical Data Analysis (EACDA 2005), Pisa, Italy, September 28-30, 2005

Comparison of Fractal Dimension Algorithms for the Computation of EEG Biomarkers for Dementia

C. Goh, B. Hamadicharef, G. T. Henderson, and E. C. Ifeachor
Proceedings of the 2nd International Conference on Computational Intelligence in Medicine and Healthcare (CIMED2005), Lisbon, Portugal, June 29 - July 1, 2005

ROC Analysis in the Evaluation of Intelligent Medical Systems

E. C. Ifeachor and B. Hamadicharef
Proceedings of the 1st European Workshop on the Assessment of Diagnostic Performance (EWADP 2004), Milan, Italy, July 7-9, 2004, pp. 23-32

Perceptual Modeling of Piano Tones

B. Hamadicharef and E. C. Ifeachor
119th Convention of the Audio Engineering Society, October 7-10, 2005, NY, USA (Preprint 6525)

Objective Prediction of Sound Synthesis Quality

B. Hamadicharef and E. C. Ifeachor
115th Convention of the Audio Engineering Society, NY, USA, October 10-13, 2003 (Preprint 5958)
<http://www.aes.org/e-lib/browse.cfm?elib=12381>

An Intelligent System Approach to Sound Synthesis Parameter Optimisation

B. Hamadicharef and E. C. Ifeachor
111th Convention of the Audio Engineering Society, NY, USA, Nov. 30 – Dec. 3, 2001 (Preprint5484)
<http://www.aes.org/e-lib/browse.cfm?elib=9860>

Artificial Intelligence based Modeling of Musical Instruments

B. Hamadicharef and E. C. Ifeachor
2nd COST-G6 Workshop on Digital Audio Effects (DAFx'99), Trondheim, Norway, December 9-11, 1999

TRAINING & SKILLS

Programming: MATLAB, C/C++, FPGA/VHD, JAVA/JSP, Latex, CUDA (NVIDIA), DSP Assembler (Motorola) Presentation (Neurobehavioral Systems, Inc.), learning R and Python

Teaching: **General Teaching Associates (GTA), University of Plymouth, U.K.**
1997-2006 Teaching Advanced Digital Signal Processing with MATLAB laboratories and coursework to B.Eng. CE/EE and M.Sc. / M.Res. CE&SP students
MATLAB and Digital Filter Design, Advanced Topics of Digital Signal Processing

Projects: Proposed and supervised research and final year projects for B.Eng. / M.Sc. students

Training: **Planning and Managing a Project**
Sept. 2008 ESI International (Tan Soon Meng, Singapore)
May 2008 **Nokia S60 Symbian platform C++ software development training course**
#4300 – Symbian Basics and #5300 - S60 C++ Basics

INTELLECTUAL PROPERTY / PATENTS

A method and system for concentration detection

Inventors: ZHANG Haihong, GUAN Cuntai, **HAMADICHAREF Brahim**, WANG Chuanchu, PHUA Koksoon

Applicant: AGENCY FOR SCIENCE, TECHNOLOGY AND RESEARCH (A*STAR)

Publication Date: November 5, 2009 / Int. Class: A61B 5/048

Application Number: PCT/SG2008/000141 (WO/2009/134205/A1)

<http://www.wipo.int/pctdb/en/wo.jsp?WO=2009134205>

Device and method for generating a representation of a subject's attention level

Inventors: GUAN Cuntai, **HAMADICHAREF Brahim**, ZHANG Haihong, WANG Chuanchu, TEE Keng Peng,

ANG Kai Keng, CHIN Zheng Yang, KRISHNAN Ranga, LEE Tih Shih, LIM Choon Guan, FUNG Daniel

Applicant: AGENCY FOR SCIENCE, TECHNOLOGY AND RESEARCH (A*STAR),

NATIONAL UNIVERSITY OF SINGAPORE, INSTITUTE OF MENTAL HEALTH

Publication Date: June 24, 2010 / Int. Class: A61B 5/0482

Application Number: PCT/SG2009/000337 (WO/2010/071604/A1)

<http://www.wipo.int/pctdb/en/wo.jsp?WO=2010071604>

A system and method for motor learning

Inventors: TEE Keng Peng, GUAN Cuntai, ZHANG Haihong, **HAMADICHAREF Brahim**

Applicant: AGENCY FOR SCIENCE, TECHNOLOGY AND RESEARCH (A*STAR)

Publication Date: December 9, 2010 / Int. Class: A61H 1/00

Application Number: PCT/SG2009/000193 (WO/2010/140975/A1)

<http://www.wipo.int/pctdb/en/wo.jsp?WO=2010140975>

PROFESSIONAL MEMBERSHIP

IEEE:	Member of Institute of Electrical and Electronic Engineers
AES:	Member of Audio Engineering Society (Secretary of the AES Singapore Section)
IET:	Associate Member of Institution of Engineering and Technology (previously IEE)
FoI:	Member of Fellowship of Inventors (Singapore)

LANGUAGES

English:	Fluent (living abroad, Plymouth 1993-2007, Singapore 2007-2011)
French:	Native speaker
Spanish:	Good level, written and spoken
Germany:	Beginner level

AWARDS

IES Prestigious Engineering Achievement Awards 2009

The Institution of Engineers, Singapore www.ies.org.sg

Dr Guan Cuntai, Dr. Zhang Haihong, Wang Chuanchu, Dr. Ang Kai Keng, Phua Kok Soon, Chin Zheng Yang,

Dr Brahim Hamadi Charef, Dr. Lu Shijian, Dr. Tee Keng Peng, Lin Rongsheng.

BCI Competition IV - Data set 2a (<http://www.bbc.de/competition/iv/results/#dataset2a>)

Research lab: Institute for Infocomm Research (I²R), Singapore

Contributors: Kai Keng Ang, Zheng Yang Chin, Chuanchu Wang, Cuntai Guan, Haihong Zhang, Kok Soon Phua,

Brahim Hamadicharef, Keng Peng Tee

BCI Competition IV - Data set 2b (<http://www.bbc.de/competition/iv/results/#dataset2b>)

Team: Zheng Yang Chin, Kai Keng Ang, Chuanchu Wang, Cuntai Guan, Haihong Zhang, Kok Soon Phua,

Brahim Hamadicharef, Keng Peng Tee

PROJECTS SUPERVISION

- **Brain-Computer interface (BCI) based Musical Composition**
MuFeng XU (2009-2010) B.Eng. Final Year Project (FYP), Nanyang Technological University, Singapore
- **DJ music using Digital Signal Processing**
Cyril Otalora (2006-2007) M.Sc. - M.Sc. Thesis, University of Plymouth, U.K.
- **Development of the BIOPATTERN Web portal**
Michael Hess (2006) Diploma thesis, Reutlingen University, Germany
- **Real-time DSP-based Audio Signal Processing**
Adrien Martin (2005) Bachelor of Science - B.Sc. Thesis, University of Plymouth, U.K.
- **Audio Quality Prediction for Digital Audio Broadcast**
Nicolai Heilemann (2005) Master Diploma - M.Sc. Thesis, University of Plymouth, U.K.
- **Independent Sound Component Analysis**
Dineshen Chuckravanen (2004) M.Sc. - M.Sc. Thesis, University of Plymouth, U.K.
- **Fuzzy Audio Signal Processing**
Simon Makadi Bawa (2004) M.Sc. - M.Sc. Thesis, University of Plymouth, U.K.
- **Investigations into Video Quality Assessment of Real-Time Video Streaming**
Michael Hess (2004) 2nd practical training term, Reutlingen University, Germany
- **Prediction of Audio Quality for Personal Audio Devices**
Charles Marzin (2003) M.Sc. - M.Sc. Thesis, University of Plymouth, U.K.
- **Automated Modeling and Synthesis of Piano Sounds**
Yifan Zhang (2003) M.Res. - M.Res. Thesis, University of Plymouth, U.K.
- **Sound Synthesis using Independent Component Analysis**
Jeremie Grizard (2003) M.Sc. - M.Res. Thesis, University of Plymouth, U.K.
- **Perceptual Modeling of the Hammond Organ**
Sascha Tenkleve (2002-2003) Diploma Ing. - Diploma Thesis, Reutlingen University, Germany
- **Digital Signal Processing based Flute modeling**
Nicola Parsley (2001) B.Eng. - Final Year Project, University of Plymouth, U.K.
- **Digital Waveguide Flute modeling**
Olivier Forgeoux (2000) B.Eng. - Final Year Project, University of Plymouth, U.K.
- **Investigations into the use of USB for audio**
Franck Failler (2000) B.Eng. - Final Year Project, University of Plymouth, U.K.