

**Muhammad Abul Hasan**  
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### Academic Qualifications

Oct 2010-Oct 2014	<b>PhD</b>	Biomedical Engineering	University of Glasgow (UK)
June2008-May2010	<b>MEngg</b>	Industrial Electronics	NED University of Engineering & Technology, Karachi
Jan2004-Dec2007	<b>BEngg</b>	Electronics	NED University of Engineering & Technology, Karachi

### Work Experience

- **Neurocomputation Laboratory, National Center of Artificial Intelligence**

**Co-PI** Research supervision and management, outreach activities, meetings and collaborations, proposing and connecting with new projects for Impact, Mar 2019-till date and procurement responsibilities

- **NED University of Engineering & Technology** (Dept of Biomedical Engineering)

**Associate Professor** **Teaching undergraduate and postgraduate students**

Jan2012-till date

Basic electronics  
Biomedical Electronics  
Biomedical Instrumentation & Measurement (I and II)  
Digital Signal Processing

**Assistant Professor**

Dec2014-Dec2021

Biosignal Processing  
Instrumentation and Measurement for food engineers  
Neuroscience & Neural Networks

**Lecturer**

Jun2008-Nov2014

Advance Biomedical Instrumentation (*MEngg*)  
Advance Digital Signal Processing (*MEngg*)  
Research Methodology (*MEngg*)  
Behavioural Perspectives of Pain (*PhD*)  
Methods of Quantitative Biosignals Analysis (*PhD*)  
Interdisciplinary Management of Pain (*PhD*)  
Technologies for Pain (*PhD*)  
Advanced Statistical Analysis (*PhD*)

**Administrative Responsibilities**

*Class Advisor:* Act as a bridge between the students and the University administration for handling scholarships, timetable coordination and attendance record.

*OBE team member:* responsible to implement OBE system in the Department of Biomedical Engineering.

*Board of Studies (BoS):* Member of BoS, Department of Biomedical Engineering, NED University of Engineering & Technology, Karachi.

*Board of Faculty (BoF):* Member of BoF, Department of Biomedical Engineering, NED University of Engineering & Technology, Karachi.

*Test Committee:* Member of committee responsible for preparing and conducting test of the applicants applied for the post of Lecturer in the Department of Biomedical Engineering in year 2015.

*Objective 2016:* Nominated for implementation of Objective 2016:

“Shifting from Teacher-centric pedagogy and Classrooms to Learner-centric through carefully developed Instruction Plans” for a course “Biomedical Electronics” in the Department of Biomedical Engineering, NEDUET.

*SAR development:* Program Team member for preparing/ developing SAR of M.Engg Biomedical Engineering Program, NEDUET.

*PhD comprehensive Exam:* Member PhD comprehensive Exam, Department of Biomedical Engineering.

*PhD Admission Committee* in the Department of Biomedical Engineering.

*Tenders:* Nominated as a representative of Biomedical Engineering department for opening of a Tender PABX System/ 6220, and Tender PC (M-IV).

*MEngg Coordinator:* Act as a bridge between the students and the University administration for handling scholarships, timetable coordination and attendance record.

#### **Research Responsibilities**

Writing research grants, Writing Manuscripts, Supervising Final Year Projects, Independent Study Projects, and PhD scholars.

- **Institute of Physical Medicine & Rehabilitation, DUHS**

**Mentor**

Academic Session  
2010

- Teaching Electro Technology course

- **University of Glasgow** (Dept of Biomedical Engineering)

**Mentor**

(Oct2011-Mar 2014)

- Mentoring students in ‘Integrated system design project’. (*Students from management and different engineering disciplines work on one project*).
- Demonstrator in Signal Processing for BioSignatures.
- Assist students in the final year projects (MEngg and BEng).

#### **Research Experience/ Interest**

Muhammad Abul Hasan is Associate Professor in the Department of Biomedical Engineering at NED University of Engineering and Technology, Pakistan. He received his Bachelors and Master in Electronic Engineering in 2008 and 2010, respectively from NED University and then he received PhD (Biomedical Engineering) degree from the University of Glasgow, UK in 2014. His research applications include cognitive enhancement (improving peak performance), management of psychological disorders, trunk stability, and pain management using non-invasive technologies (complementary therapy), neuro-rehabilitation, and signal processing. He works on recording and processing of multi-channel EEG and EMG signals, transcranial direct current stimulation, neurofeedback, binaural beats, cold pressor test, and transcutaneous electrical nerve stimulation. He is experienced in doing frequency, time-frequency, and time domain analysis of EEG and EMG signals.

Currently, three undergraduates, four MEngg, and three PhD scholars are working under his supervision. Two students have completed PhD under his supervision. He has supervised various final year projects and MEngg thesis.

#### **Research Skills**

- Experienced in clinical work with patients suffering from chronic pain

- Experienced in EEG recording using ‘Neuroscan’ and ‘g.usb amplifier’ EEG devices
- Familiar with Neurosky EEG device
- Experienced in ‘MATLAB’ and ‘EEGLAB’ softwares for EEG data processing
- Experienced in sLORETA for EEG source localization
- Experienced in SIFT for Granger-Causality
- Experienced in EEG, EMG and ECG (3 leads) recordings using ‘Power Lab’ device
- Signal Processing including EEG time-frequency analysis, ERP, ICA and connectivity analysis
- Good presentation skills
- Able to work independently and in a group
- Statistical analysis using MATLAB
- Familiar with LABVIEW
- Familiar with open vibe software for BCI applications
- Experience in connectivity analysis
- Experience in using neuromodulation devices

#### **Trainings/Meetings/ Workshops Attended**

Feb 2018	Procurement Practices organized by NED University
July 2017	QEC Training Programme “HEI Ranking” organized by NED University
Dec 2016	HEC Indigenous on Campus Training Programme on OBE, NED University of Engineering & Technology
Dec 2016	Training on developing/ preparing SAR of M.Engg/ MEM/ MS programmes, NEDUET
May 2016	Training on design of Instruction Plans for Objective 2016: “Shifting from Teacher-centric pedagogy and Classrooms to Learner-centric through carefully developed Instruction Plans”.
Dec 2015	Seminar on Intellectual Property organized by HEC in collaboration with IPO and UNIDO
Nov 2015	Seminar on National ICT R&D Fund at NED University Karachi
Oct 2015	International workshop on OBE system organized by HEC at NEDUET
Dec 2012	Attended ‘Scottish Intercollegiate Guidelines Network ‘meeting on Chronic Pain
Jun 2012	Course on Event Related Potential (ERP) in Birmingham, UK (03 Days)
Apr 2011	Course on EEG Neurofeedback in London
Sep 2010	Training on Research Orientation organized by NED University (02 Days)
May 2010	Training on IEEE Xplore 2.0 at NED University

#### **Awards and Honours**

2021	Best Research Award from NED University
2021	NEDAASC award of PKR 100,000 for the Final year project “Smart Brain Trainer”
2020	NGIRI, Ignite awarded PKR 69,000 for the Final year project “Smart Brain Trainer”
2020	NGIRI, Ignite awarded PKR 69,900 for the Final year project “Back in Control”
2019	DICE Virtual Innovation Competition, 2019, Project title “Cardiac Auscultation Simulator”
2019	Presented Project title “Cardiac Auscultation Simulator” in “5th All Pakistan DUHS-

	DICE Health Innovation Exhibition
2019	Presented Project title “Effectiveness of TENS” in “5th All Pakistan DUHS-DICE Health Innovation Exhibition
2019	NGIRI, Ignite awarded PKR 68,000 for the Final year project “Cognitive Test During Experimentally Inducing Pain”
2019	NGIRI, Ignite awarded PKR 69,506 for the Final year project “Cardiac Auscultation Simulator”
2016	Won Special Prize on “Design of non-invasive Pacemaker” in DICE-DUHS
2015	HEC approved PhD supervisor
2015	Won first prize in DICE-DUHS
2015	Organized an event PIBE (Project & Ideas of Biomedical engineering) in the Department of Biomedical Engineering NEDUET
2012	GU68 award ( <a href="http://www.guengtrust.org.uk/awards_history">http://www.guengtrust.org.uk/awards_history</a> )
2010	PhD Scholarship- NED University of Engineering & Technology

#### **Members (Apart from NED University)**

2019-till date	Member of Board of Studies, Department of Biomedical Engineering, Ziauddin University
2018-till date	Member of Board of Studies, Department of Biomedical Engineering, Sir Syed University of Engineering & Technology
2018-till date	PEC Expert, Biomedical Engineering
2018-2020	CIEC Expert, Biomedical Engineering
2017-till date	Member of Board of Studies, Department of Biomedical Engineering, Barrett Hodgson University
2017 (May)	Member of National Curriculum revision committee preliminary meeting in Biomedical Engineering (03 Days), Phase 2.
2017 (Feb)	Member of National Curriculum revision committee preliminary meeting in Biomedical Engineering (03 Days), Phase 1.
2015	Member SAR evaluation committee Biomedical Engineering Program, Hamdard University

#### **Public Awareness Articles/ Activities**

Mar-2012	‘Easing the pain’ is published in University of Glasgow website Headlines. This article describes the effect of Neurofeedback Training for treatment of chronic central neuropathic pain. ( <a href="http://www.gla.ac.uk/research/infocus/projects/headline_281501_en.html">http://www.gla.ac.uk/research/infocus/projects/headline_281501_en.html</a> )
2012	‘Easing the Pain’ is published in Spinal Cord Injury Scotland magazine. This article reports the patient perspective after getting Neurofeedback Training for managing chronic central neuropathic pain. ( <a href="http://www.sisonline.org/images/content_files/FINAL_APPROVED_VERSION_Summer_2012_SIS_News_A4_36pp.pdf">http://www.sisonline.org/images/content_files/FINAL_APPROVED_VERSION_Summer_2012_SIS_News_A4_36pp.pdf</a> , page 12)

- Nov 2013 *'The Power of the Mind'* is broadcasted on Internet radio program 'Airing Pain' Episode 47. <http://painconcern.org.uk/how-we-help/airing-pain/>
- April 2014 *'Training the Brain' under 'Exploring pathways of Pain'* is published in Horizons Magazine at University of Glasgow. ([http://www.gla.ac.uk/research/horizons/spring2014/exploringpathwaysofpain/?utm\\_source=newsletter](http://www.gla.ac.uk/research/horizons/spring2014/exploringpathwaysofpain/?utm_source=newsletter))

### **Technical Presentations**

- Mar 2021 Presented "Cognitive behavioral therapy through binaural beats" in Innovation Lab Webinar arranged by Mustafa prize Science and Technology Award. (<https://mustafaprize.org/news/?id=5220>)
- Nov 2020 Presented topic "Effect of Binaural Beat on Working Memory" virtually at University of Glasgow.
- Nov 2020 Presented topic "Smart phone application for road safety" in AKUH Journal Club.
- Feb 2020 Presented topic "Machine learning and validity of binaural beat protocols" at International Neurology Conference, UK
- Feb 2019 Hands on Experience Workshop on OBE at Centre for Learning and Teaching (CLT), Barret Hodgson University Karachi.
- Dec 2018 Tanning session on OBE at Department of Biomedical Engineering, Hamdard University.
- Apr 2017 What is 'Outcome Based Education (OBE)' and How to implement OBE in the Department of Biomedical Engineering?
- Apr 2017 Hands on Experience Workshop on OBE in the Department of Biomedical Engineering, NED University.
- Mar 2017 Workshop on Arduino microcontroller at DIHE
- Apr 2015 'Brain computer interfacing' in the Hamdard Institute of Engineering & Technology, Hamdard University.
- Sep 2014 'Quantitative EEG analysis and Neuromodulation for Treatment of Central Neuroapthic Pain in Paraplegics Patients' in 43<sup>rd</sup> SCISCI clinical research meeting held at Queens Elizabeth National Spinal Injuries unit, Glasgow. (<http://www.gla.ac.uk/departments/scisci/>)
- Sep 2014 'Reduced Activation at Cortical Level Following Neurofeedback Treatment is Associated with Reduction in Central Neuropathic Pain Intensity' in 6<sup>th</sup> International BCI conference, Austria (Skype presentation).
- Sep 2012 'Voluntarily modulation of EEG rhythms reduces Neuropathic pain in patients with Spinal Cord Injury' in the 51<sup>st</sup> annual scientific meeting on advances in spinal cord injury management, London.
- Feb 2012 'Neurofeedback for treatment of central neuropathic pain following Spinal Cord injury' in 'Technologies of the mind' meeting held in University of Glasgow. ([http://web.eng.gla.ac.uk/frm tmp/techofmind\\_reg.html](http://web.eng.gla.ac.uk/frm_tmp/techofmind_reg.html))

**Publications** (Impact points=35, H-index=6, i10index=6, citations=251)

**Journal Publications**

- 1- Hira Shahid, Muhammad Abul Hasan, Osama Ejaz, Hashim Raza Khan, M. Idrees, Mishal Ashraf, Sobia Aftab, Saad A. Qazi, The severity of Depression, Anxiety, and Stress: Recommendations from joint work of research center and psychology clinics in COVID-19 Pandemic. *Frontiers in Psychiatry*. 2022. DOI=10.3389/fpsy.2022.839542 [IF= **4.157, Science Citation Index Expanded**] **2022**
- 2- AZ Rao, Muhammad Abul Hasan, Evaluation of a Chair-Mounted Passive Trunk Orthosis: A Pilot Study on Able-Bodied Subjects. *Sensors*. 2021. 21(24) [IF= **3.576, Science Citation Index Expanded**] **2021**
- 3- Muhammad Abul Hasan, Aleksandra Vuckovic, Parisa Sattar, Saad Qazi, and Matthew Fraser. Brain Networks with Modified Connectivity in Patients with Neuropathic Pain and Spinal Cord Injury. *Clinical EEG and Neuroscience*. Accepted [IF= **1.843, Science Citation Index Expanded**]
- 4- Bilal Ahmed Usmani, Mustafain Ali, Muhammad Abul Hasan, Amna Rehana Siddiqui, Sameen Siddiqi, Aaron G Lim, Saad Ahmed Qazi. The impact of disease control measures on the spread of COVID-19 in the Province of Sindh, Pakistan. Accepted in *PLoS One*. [IF= **3.24 Science Citation Index Expanded**]
- 5- Umair Majeed, Meha Fatima Aftab, Deedag Murad Baloch, Sana Ahmed, Imran M Yusuf, Muhammad Abul Hasan, Muhammad Sameer Qureshi. Modulation of Heart and Brain Function by Surah Al-Rehman Recitation Among Distressed Diabetic Patients in Pakistan. *J Relig Health*. 2021 Sep 23. doi: 10.1007/s10943-021-01431-2. [IF= **1.898, Science Citation Index Expanded**]
- 6- Hashim Raza Khan, Majida Kazmi, Haris Bin Ashraf, Muhammad Hashir Bin Khalid, Abul Hasan, Saad Ahmed Qazi. An Isolated Power Factor Corrected Cuk Converter with Integrated Magnetics for Brushless DC Ceiling Fan Applications. *Electronics*. 2021, 10 (14), 1720- <https://doi.org/10.3390/electronics10141720>. [IF= **2.397, Science Citation Index Expanded**]
- 7- Muhammad Danish Mujeeb, Muhammad Abul Hasan, Saad A Qazi, Aleksandra Vuckovic. Understanding the Neurological Mechanism Involved in Enhanced Memory Recall Task Following Binaural Beats: a Pilot study. May 2021. *Experimental Brain Research*. DOI: <https://doi.org/10.1007/s00221-021-06132-6> [IF= **1.972, Science Citation Index Expanded**]
- 8- Muhammad Abul Hasan, Hira Shahid, Hashim Raza Khan, Saad A Qazi, Matthew Fraser. Distinguishing Voluntarily Upregulation of Localized Central Alpha from Widespread Posterior Alpha. *Applied Psychophysiology and Biofeedback*. April 2021. DOI: 10.1007/s10484-021-09511-5. [IF= **2.0, Science Citation Index Expanded**]
- 9- Hasan MA, Vuckovic A, Qazi SA, Yousuf Z, Shahab S, Fraser M. Immediate effect of neurofeedback training on the pain matrix and cortical areas involved in processing neuropsychological functions. *Neurol Sci*. 2021 Feb 23. doi: 10.1007/s10072-021-05125-1. Epub ahead of print. PMID: 33624179. [IF= **3.307, Science Citation Index Expanded**]
- 10- Mohammed Gamil Mohammed Saif, Muhammad Abul Hassan, Aleksandra Vuckovic. Efficacy evaluation of neurofeedback applied for treatment of central neuropathic pain using machine learning. *SN Applied Sciences*. 1-11, 2021, 3 (1). [Emerging Sources Citation Index]
- 11- H. R. Khan, M. A. Hasan, M. Kazmi, N. Fayyaz, H. Khalid, S. A. Qazi. A Holistic Approach to Urdu Language Word Recognition using Deep Neural Networks. *Engineering, Technology & Applied Science Research*. 7140-7145, 2021, 11(3). [Emerging Sources Citation Index]
- 12- Anwar Ali Gaho, Ahmed Muddassir Khan, Muhammad Abul Hasan. Functional MRI Based Brain Mapping in Occipital Gyrus using Face Stimuli. *Pakistan Journal of Engineering & Technology*, 8-13, Dec 2020, 3(3).

- 13- Adamson MM, Shakil S, Sultana T, Hasan MA, Mubarak F, Enam SA, Parvaz MA and Razi A. Brain Injury and Dementia in Pakistan: Current Perspectives. (2020) *Front. Neurol.* 11:299. doi: 10.3389/fneur.2020.00299. **[IF= 3.552, Science Citation Index Expanded]**. (PhD Student Work) **2020**
- 14- Muhammad Abul Hasan, Matthew Fraser, Saad A Qazi. Quantitative Criteria for the Validation of EEG Neurofeedback Training Protocol. *NED University Journal of Research-Applied Sciences.* 67-79, 2019, XVI (4). **[HEC 'X' category]** **2019**
- 15- Aleksandra Vuckovic, Mohammed Jarjees, Muhammad Abul Hasan, Makoto Miyakoshi, Matthew Fraser. Central Neuropathic Pain in Paraplegia Alters Movement Related Potentials. *Clinical Neurophysiology.* 1669-1679, 2018, 129 (8). **[IF= 3.477, Science Citation Index Expanded]** **2018**
- 16- Muhammad Abul Hassan, Matthew Fraser, Bernard A. Conway, David B. Allan, and Aleksandra Vuckovic. Reversed cortical over-activity during movement imagination following neurofeedback treatment for central neuropathic pain. *Clinical Neurophysiology.* 3118-3127, 2016, vol 127. **[IF= 3.477, Science Citation Index Expanded]** **2016**
- 17- Aleksandra Vuckovic, Muhammad Abul Hasan, Bethel Osugiuwa, Matthew Fraser, D B Allan, B A Conway. The Influence of Central Neuropathic Pain in Paraplegic Patients on Performance of Motor Imagery Based Brain Computer Interface. 2015. *Clinical Neurophysiology.* **[IF= 3.477, Science Citation Index Expanded]** **2015**
- 18- Muhammad Abul Hassan, Matthew Fraser, Bernard A. Conway, David B. Allan, and Aleksandra Vuckovic. The mechanism of neurofeedback training for treatment of central neuropathic pain in paraplegia: a pilot study. *BMC Neurology*, 2015, 15:200. **[IF= 1.961, Science Citation Index Expanded]**
- 19- Ren Xu, Ning Jiang, Aleksandra Vuckovic, Muhammad Abul Hasan, Natalie Mrachacz Kersting, David Allan, Matthew Fraser, Bahman Nasseroleessami, B A Conway, Kim Dremstrup, Dario Farina. Movement-related cortical potentials in paraplegic patients: abnormal patterns and considerations for BCI-rehabilitation. 2014. *Frontiers in Neuroengineering*, vol 7, 1-9. **[IF= 3.43, Science Citation Index Expanded]**. (From my PhD Data) **2014**
- 20- A Vuckovic, M A Hasan, M Fraser, B A Conway, B Nasseroleessami, D B Allan. Dynamic Oscillatory Signatures of Central Neuropathic Pain in Spinal Cord Injury. 2014. *The Journal of Pain*, 15(6), 645-655. **[IF= 4.759, Science Citation Index Expanded]**
- 21- Muhammad Abul Hasan, Hira Shahid, Saad Ahmed Qazi, Osama Ejaz, Muhammad Danish Mujib, Aleksandra Vuckovic. Underpinning the Neurological Source Of Executive Function Following Cross Hemispheric tDCS Stimulation. Submitted.

#### **Conference Publications**

- 22- Muhammad Danish Mujib, Muhammad Abul Hasan, Saad Ahmed Qazi Modified. Theta Band Connectivity and Enhanced Working following Binaural Beat Stimulation. 1st International Conference on Emerging Trends in Physics, May 23 and 24 2022. Bahawalpur, Pakistan **2022**
- 23- Hira Shahid, Osama Ejaz, Parisa Sattar, Muhammad Miqdad Khan, Fatima Zubair, Mariam Mukhtar, Umer Farooq, Muhammad Nehal, Hamna Sheikh, Hira Ashfaq Lodhi and **2021**

- Muhammad Abul Hasan. Transcranial Direct Current Stimulation (tDCS): A Promising Therapy for Attentional Enhancement. 1st International Conference on Applied Physics and Engineering 2021, 26th & 27th August 2021, Karachi, Pakistan.
- 24- Osama Ejaz, Hira Shahid, Parisa Sattar, Umer Farooq, Muhammad Nehal, Hamna Sheikh, Muhammad Miqdad Khan, Fatima Zubair, Mariam Mukhtar, Hira Ashfaq Lodhi and Muhammad Abul Hasan. Transcranial Direct Current Stimulation (tDCS): An Effective & Non-Medicated Treatment for Psychological Disorders. 1st International Conference on Applied Physics and Engineering 2021, 26th & 27th August 2021, Karachi, Pakistan.
- 25- Muhammad Abul Hasan, Danish Mujib, Saad Qazi and Osama Ejaz. Machine learning and validity of binaural beat protocols: Trainability and interpretability. *International Neurology and Cognitive Neuroscience*, 24<sup>th</sup> & 25<sup>th</sup> Feb 2020, London, UK. **2020**
- 26- Muhammad Nabeel, Muhammad Sumaid Mukhtar, Ahmad Zahid Rao, Syed Muhammad Haider Raza, Ali Baig, Muhammad Abul Hasan. A Quality monitor for Cardio-Pulmonary Resuscitation (CPR). In *34th All Pakistan IEEEP Students Seminar*, 12th January 2019, Karachi, Pakistan. **2019**
- 27- Erum Aslam, Amber Siddiqui, Danish Mujib, Tariq Javid, Nadeem Saleem and Abul Hasan. Real time Gait Analysis of Knee Joint Mobility during Walking and Running by using Strain Gauge Goniometer. *IEEE 5th Student Conference on Engineering Sciences and Technology (SCONEST 2016)*, 14<sup>th</sup> & 15<sup>th</sup> December 2016, Karachi, Pakistan. **2016**
- 28- Aleksandra Vuckovic, Muhammad Abul Hasan, Matthew Fraser, D B Allan, B A Conway. A pilot study on clinical and neurological Effects of Neurofeedback Training for Treatment of Central Neuropathic Pain. In *proceedings of ICNR conference 2014 Denmark*, 823-831. Book Title: *Replace, Repair, Restore, Relieve—Bridging Clinical and Engineering Solutions in Neurorehabilitation*. DOI: 10.1007/978-3-319-08072-7\_113. **2014**
- 29- Muhammad Abul Hasan, Aleksandra Vuckovic, Matthew Fraser, D B Allan, B A Conway. Reduced Activation at Cortical Level Following Neurofeedback Treatment is Associated with Reduction in Central Neuropathic Pain Intensity. In *Proceedings of the 6th International BCI conference 16-19<sup>th</sup> September 2014, Graz, Austria*. Book Title: *The Future of Brain Computer Interaction: Basics, shortcomings, users*. DOI: 10.3217/978-3-85125-378-8. ISBN: 978-3-85125-378-8.
- 30- Muhammad Abul Hasan, Vuckovic A, David B. Allan, Matthew Fraser. On-line EEG Training Reduces Central Neuropathic Pain. *GRPe Conference 2013 Glasgow*. June 2013. **2013**
- 31- A Vuckovic, B. Conway, M.A. Hasan, B. Kalman. Source Information Flow study on EEG data during Motor Imagery. Pg 67-68. *Bioengineering conference 2013*. Glasgow UK. 6<sup>th</sup> -7<sup>th</sup> September 2013.
- 32- Vuckovic A, Muhammad Abul Hasan, Matthew Fraser, David B. Allan. Effects of Neurofeedback Treatment on Neuropathic Pain Following Spinal Cord injury. *14<sup>th</sup> world congress on pain, IASP 2012 Milan*. 27<sup>th</sup>-31<sup>st</sup> Aug 2012. Abstract PW544. **2012**
- 33- Muhammad Abul Hasan, Vuckovic A, David B. Allan, Matthew Fraser. Voluntarily modulation of EEG rhythms reduces Neuropathic pain in patients with Spinal Cord Injury. *51st Annual Scientific Meeting ISCOS 2012 London- Advances in Spinal Cord Injury Management*. 3<sup>rd</sup>-5<sup>th</sup> sep 2012. Abstract O26, page 78.
- 34- Vuckovic A, Muhammad Abul Hasan, Matthew Fraser, David B. Allan. Design and experimental evaluation of Neurofeedback system for treatment of Central Neuropathic Pain. *National Health Informatics Scotland, Glasgow*. 20<sup>th</sup>-21<sup>st</sup> Sep 2012.



- 35- Vuckovic A, Muhammad Abul Hasan, Bahman Nasserolelami, Bernard A. Conway, David B. Allan, Matthew Fraser. **Motor imagery in spinal cord injury with neuropathic pain: a component clustering method.** *Proceedings of the 4th International Symposium on Applied Sciences in Biomedical and Communication Technologies.* ISABEL 2011, October 26-29, Barcelona, Spain. ACM New York, NY, USA. ISBN: 978-1-4503-0913-4. DOI: [10.1145/2093698.2093866](https://doi.org/10.1145/2093698.2093866). **2011**
- 36- Vuckovic, A., Hasan, M.A., Conway, B.A., Allan, D.B., and Fraser, M. (2011) *Neurofeedback for treatment of neuropathic pain in SCI patients.* [Science Research Update](#), 1 . p. 18.

### Research Grants

	Title	Funding Agency	Amount/ Duration	Status
1.	Comparison between Audiovisual and Visual Beta Neurofeedback for Attention Enhancement	Foundation for Neurofeedback and Neuromodulation Research	\$2000/ (July 2022-June 2023)	Open
2.	Neurofeedback: A technology enabled system to improve brain performance of healthy individuals and mentally impaired patients	HEC Pakistan, NRPU	8.6M PKR/ (May 2022-Apr 2025)	In progress
3.	COVID-19 GIS based Intelligent Decision Support System for Province of Sindh	The World Bank	6.8M/ (June-Dec 2020)	Closed
4.	The Mechanism of combined neuromodulatory approaches: implications towards treatment of central nervous system disorders	Ministry of Science & Technology Endowment Fund	3M/ October 2018	Closed
5.	Trunk stability device for people with Duchenne muscular dystrophy	NED University of Engineering & Technology (for PhD supervision)	1M/ October 2018	Closed
6.	Effect of Neurostimulation on Effective Connectivity of Resting State Network in Traumatic Brain Injury.		0.85 M/ Aug 2021-2023	In progress
7.	Establishment of Neurocomputation Laboratory, National Center of Artificial Intelligence	Ministry of Planning & Commission, Higher Education Commission, Pakistan	March 2019-Feb 2022	In progress
8.	Biomedical Electronics and Bioinstrumentation Laboratory Expansion	UDWP, NED University of Engineering & Technology	2.4 M/ 2018	Closed
9.	Smart Brain Trainer	The NED Alumni Association of Southern California for FYP supervision	0.1 million/ 2021	Closed
10.	Smart Brain Trainer	NGIRI, Ignite (National Technology Fund) for FYP supervision	69K/ 2020	Closed
11.	Back in Control		69K / 2020	Closed
12.	Cognitive Test During Experimentally Inducing Pain		68K/ 2019	Closed
13.	Cardiac Auscultation Simulator		69.5K/ 2019	Closed

### Ongoing Projects

<b>Projects</b>	<b>Collaborator</b>
tDCS for cognitive function and mental health	Biomedical Engineering Department of James Watt School of Engineering at the University of Glasgow
Assessment and Rehabilitation of Drug Addictive	Department of Psychiatry and Neuroscience at Icahn School of Medicine at Mount Sinai Al'Shakoore Foundation New Horizon Care Center
Virtual Reality for Stress management	Department of Psychiatry and Neuroscience at Icahn School of Medicine at Mount Sinai
Corporate cognitive assessment	Al'Shakoore Foundation New Horizon Care Center
Neuromodulation for experimental pain management	Biomedical Engineering Department of James Watt School of Engineering at the University of Glasgow
Beta Neurofeedback for Attention Enhancement	Biomedical Engineering Department of James Watt School of Engineering at the University of Glasgow
Acceptance and Feasibility of home based neuro-stimulation system (tDCS)	None

### References

Will be provided upon request.