

# Professor Dr. Muhammad Shafique

(HEC Pakistan Approved Ph.D. Supervisor)

## Personal Details

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**Name** Prof. Dr. Muhammad Shafique  
**Contact:** Email: Muhammad.Shafique@riphah.edu.pk  
Mobile: 0092-333-851-7779  
**Designation:** Professor /Head of Biomedical Engineering Department  
Faculty of Engineering and Applied Sciences  
Riphah International University, Islamabad

## Academic Qualification

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- Oct 2006 – April 2011**      **Ph.D. Biomedical Engineering. City University of London, U.K**  
School of Engineering and Mathematical Sciences.  
Title: Investigation of photoplethysmography and arterial blood oxygen saturation during artificially induced peripheral hypoperfusion utilising multimode photometric sensors.
- Under the Supervision of Prof Dr. P A Kyriacou. Associate Dean, Postgraduate Studies.
  - In collaboration with R & D St Andrew's Centre for Plastic Surgery & Burns Broomfield Hospital
  - The research involved the design and development of a novel multimode finger PPG probe, the development of a multimode PPG processing system, the use of engineering softwares (LabVIEW and Matlab) to implement algorithm to estimate SpO2 values and to process and analyse the acquired data from volunteers during the experiments. Produced several research publications.
- Sept 2005 - Aug 2006**      **M.S. Medical Electronics and Physics. Queen Mary University of London, U.K**
- Courses include: Instrumentation, Digital Design, Signal Processing, Medical Imaging and Microprocessors, etc.
  - Dissertation on Critical Review of fMRI Principles, Technology and Applications.
- Jan 1999 - Nov 2003**      **B.Sc. Biomedical Engineering. Sir Syed University of Engineering & Technology Karachi, Pakistan (91%, Gold Medal)**
- Courses include: Biomechanics, Biomedical Instrumentation, Circuit Analysis, Signal and Systems, Digital Logic Design, Introduction to Microprocessor, Mechanical Engineering, Medical Equipment, Bio-statistic, etc.
  - Projects: Design and development of Medical Centrifuge. Worked on ATMEL 89C51 Microcontroller and LCD display. Made various Electronic circuits like Digital Clock, Frequency Counter, and Motor Drive Circuits etc. Digitally controlled Medical Centrifuge Machine as a final year project in Undergraduate studies.

## Work Experience

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- July 2013 – Till date**      **Head of the Department/ Professor** – Biomedical Engineering, Faculty of Engineering and Applied Sciences, Riphah International University, Islamabad
- Administrative Duties:**
- Academic planning
  - Development of Biomedical Engineering laboratories
  - Conduct meetings

- Quality enhancement
- Research governance
- Staffing
- Information dissemination

***Achievements: As HoD BME, the students' strength increased from 37 to 190+. Have successfully launched Ph.D. and M.S. BME programs which have now a strength of 30+ students.***

#### **Teaching**

- Biomedical Sensors (PhD/MS Biomedical Engineering)
- Advanced Biomedical Instrumentation (PhD/MS Biomedical Engineering)
- Selected Topics in Biomedical Engineering (MS/PhD Biomedical Engineering)
- Biomedical Electronics (BSc Biomedical Engineering, 2<sup>nd</sup> year)
- Biomedical Instrumentation-I/Patient Monitoring Equipment (BSc Biomedical Engineering, 3<sup>rd</sup> year)
- Biomedical Instrumentation-II/Laboratory Equipment (BSc Biomedical Engineering, 4<sup>th</sup> year)
- Supervision of PhD/MS/BS Projects

***Achievements: Designed and taught new courses such as Biomedical Sensors, Advanced Biomedical Instrumentation at MS/PhD level. Inculcated new methodologies at both undergraduate and graduate levels to motivate the students to start doing research, adapt to experiential learning and critical thinking. As a result various undergraduate/post graduate students presented and published their research work.***

July 2003 - June 2013

**Lecturer** - Riphah International University Islamabad Pakistan.

- Teaching Undergraduates courses & Supervision of minor and final year projects. Subjects taught:
- Instrumentation (BEng, 4<sup>th</sup> year)
- Digital Logic Design (BEng, 2<sup>nd</sup> year).
- Played a major role in developing programme of studies for Undergraduate Biomedical Engineering and Electronics Engineering.
- Director of Biomedical Engineering Lab.
- Setting up exam papers and assessments.
- Actively involved in preparation of laboratories and documents for the accreditation visit of PEC

Oct 2011 – Sept 2012

**Academic Fellow/Post-Doc** – School of Engineering and Mathematical Sciences  
City University of London, UK

- Conducting research in the field of Biomedical Engineering. Specifically working on the novel techniques of acquiring photoplethysmographic (PPG) signal and its application in estimation of oxygen saturation values.
- Providing research support to graduate

Jan 2007- Nov 2011

**Lecturer – School of Engineering and Mathematical Sciences City University of London**

- Taught the following modules:
  - o Research Methods (MSc, Computer Systems, Electrical, Mechanical and Biomedical Engineering students)
  - o Bioinstrumentation (BEng, 2<sup>nd</sup> year)
  - o Biomedical Optics 1 (BEng, 2<sup>nd</sup> year)
  - o Biomedical Optics 2 (BEng, 3<sup>rd</sup> year)
  - o Engineering Science (BSc, 1<sup>st</sup> year)
  - o Engineering Practice (BSc, 1<sup>st</sup> year)
- Supervision of undergraduate final year students' and post graduate students' projects.
- Conducting labs for Bioinstrumentation, Engineering practice and Engineering science.
- Assessment of final year project reports, course works and examination papers.
- Conducted LabVIEW training for teaching staff and research students.

Jan 2003 – June 2003

**Service Engineer - Imperial Pvt. Ltd Karachi.**

- Repairing medical equipment that includes:
  - o Infusion pump
  - o ECG machine
  - o Doppler flow meter
  - o Pulse oximeter
  - o Ventilator

**Guest Lecturer/Keynote**

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- Invited as a **guest lecturer** by Nanjing University of Aeronautics and Astronautics (NUAA), China for a week (25<sup>th</sup> Aug – 31<sup>st</sup> Aug 2012) to teach circuit analysis to the 3<sup>rd</sup> year Undergraduate Electrical engineering students.
- **Keynote:** 2nd International Conference on Rehabilitation Sciences (ICRS) - May 19-21, 2017, Jacaranda Family Club Islamabad. Topic: Biomedical engineering in rehabilitation sciences “Need of bridging the efforts to improve health care”

**Memberships/Reviewer**

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- o **PEC expert for test/trials of locally manufactured ventilators for COVID-19 patients**
- o **DRAP expert: Expert for evaluation of medical devices**
- o **Convener/Expert PEC Biomedical Engineering Accreditation/inspection team under Washington Accord**
- o **Member of joint technical working group for ehealth/mhealth, Ministry of National Health Services, Regulation and coordination.**
- o **Member, EPE Curriculum & Experts Committee for Electrical Engineering & Allied Disciplines**
- o **Secretary and Expert, National Curriculum Review Committee (NCRC), Pakistan**
- o **Member IEEE**
- o **Member of Institute of Physics (IOP)**
- o **Member (professional engineering) of Pakistan Engineering Council (PEC)**

- **Reviewer**, Journal of computer in Biology and Medicine
- **Reviewer**, Medical & Biological Eng. & Computing (MBEC, IEEE)
- **Reviewer**; Journal of Clinical Monitoring and Computing
- **Reviewer**; Journal of Biomedical Graphics and Computing
- **Reviewer**; Journal of Sleep Disorders & Therapy
- **Reviewer**, International Conference on Biomedical Engineering and Biotechnology

## Scholarships/Awards

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- **Employee Award** (certificate and cash award) of the year 2019 by Riphah International University, Islamabad
- **Employee Award** (certificate and cash award) of the year 2018 by Riphah International University, Islamabad
- **Employee Award** (certificate and cash award) of the year 2017 by Riphah International University, Islamabad
- Awarded **Ph.D. scholarship by City University London**
- Awarded **Partial support for Ph.D. studies abroad** by Higher education commission Pakistan (HEC)
- Awarded Westfield Trust Bursary for being the **best student** of MSc at QMUL
- Awarded **merit scholarship** every year during undergraduate studies
- University **Gold medal** on securing top position in BSc Biomedical Engineering
- **Cash Award** from Governor of Sindh on securing top position in B.Sc. Biomedical Engineering

## Workshops (selected)

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- OBA (**Washington Accord**) Accreditation Process for Program Evaluators, organized by PEC, 29<sup>TH</sup> April 2017, Islamabad (1 CPD Point)
- 2 Days International workshop on OBE organized by Riphah International University, Islamabad, 2,3 May 2017 (1 CPD Point)
- Strategic Vision Workshop organized by Riphah International University, Islamabad on Feb 3, 2017
- Attended a two days' workshop on "writing winning research grant" held at COMSATS Islamabad
- One day workshop on Strategic planning at Riphah International University, Islamabad.
- 5 Days Workshop on "DUNE-PDELAB Open Source Software" application for Numerical Solution of Partial Differential Equations. IWR Germany and CIIT Pakistan" (5<sup>th</sup> October to 9<sup>th</sup> October 2015).
- Overview on Engineers Mobility, Accreditation and FEIAP Engineering Education Guidelines
- Outcome Based Education System organised by PEC Islamabad on 16<sup>th</sup> September 2015.
- Workshop on Outcome Based Education and Assessment System of Accreditation organised by PEC
- Project development framework; organised by Riphah International University Islamabad.

## Skills

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- Designing and development of circuits for biomedical instruments
- Development of Biomedical Sensors

- Data analysis
- Biomedical data acquisition
- Signal analysis
- Academic/research writing
- LabView, Matlab, Sigmastat
- Lyx, MS Office

## Projects/Grants:

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- 1- Design and development of a patient monitor for vital signs and stress measurement.  
P.I  
Funded by HEC TTSTF, Rs. 12.7 M  
Awarded in April 2021
- 2- Development of Robotic Arm using EMG signals  
P.I  
Funded by HEC- Rs.2.9 M, NRP  
Awarded in 2019 - Completed
- 3- Indigenous Development of Ventilator  
P.I  
Funded by PSF – Rs. 12M  
Awarded – 2020 – Ongoing
- 4- Development of an assistive device to convert sign language into speech, for use by persons with speech disability  
Co P.I.  
Rs. 9.7M funded by HEC, LCF  
Awarded – 2021 - Ongoing
- 5- Smart stick for blind people  
Co P.I.  
Rs. 14M funded by HEC, TDF  
Awarded – 2018 - Completed
- 6- Multimode non-invasive PPG and pulse oximetry system for peripherally arterial oxygen saturation compromised patients.  
Funded by Broomfield hospital, UK and City University London  
Completed
- 7- Optimization of EEG data acquisition system.  
Funded by Riphah International University, Islamabad  
Completed
- 8- Alzhiemr's detection using EEG signals  
Funded by New Zealand College of Chiropractic and Riphah International University, Islamabad  
Completed
- 9- Synthesis of nanogold particles for cancer detection  
Funded by Riphah - Completed

## [Publication List \(Google Scholar Citation\) Total I.F = 46+, Citation = 295+](#)

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- 1- **Title:** Chiropractic spinal adjustment increases the cortical drive to the lower limb muscle in chronic stroke patients.  
**Journal:** Frontiers in Neurology, section Neurorehabilitation (Jan 2022)  
**Authors:** Muhammad Samran Navid, Imran Khan Niazi, Dina Lelic, Imran Amjad, Nitika Kumari, Muhammad Shafique,

Kelly Holt, Usman Rashid, Asbjørn Mohr Drewes, Heidi Haavik  
**Impact Factor:** 4.003

- 2- **Title:** The Effects of 4 Weeks of Chiropractic Spinal Adjustments on Motor Function in People with Stroke: A Randomized Controlled Trial  
**Journal:** Brain Sciences (May 2021)  
**Authors:** Kelly Holt , Imran Khan Niazi, Imran Amjad, Nitika Kumari , Usman Rashid, Jens Duehr, Muhammad Samran Navid , Muhammad Shafique and Heidi Haavik  
**Impact Factor:** 3.332
  
- 3- **Title:** Functional Connectivity Analysis on Resting-State Electroencephalography Signals Following Chiropractic Spinal Manipulation in Stroke Patients  
**Journal:** Brain Sciences (Sept 2020)  
**Authors:** Toby Steven Waterstone, Imran Khan Niazi, Muhammad Samran Navid, Imran Amjad, Muhammad Shafique, Kelly Holt, Heidi Haavik, Afshin Samani  
**Impact Factor:** 3.332
  
- 4- **Title:** Decoding Attempted Hand Movements in Stroke Patients Using Surface Electromyography  
**Journal:** Sensors (Nov 2020)  
**Authors:** Mads Jochumsen , Imran Khan Niazi, Muhammad Zia ur Rehman, Imran Amjad, Muhammad Shafique, Syed Omer Gilani and Asim Waris  
**Impact Factor:** 3.275
  
- 5- **Title:** Leveraging ANN and LDA Classifiers for Characterizing Different Hand Movements Using EMG Signals  
**Journal:** Arabian Journal for Science and Engineering (Oct 2020)  
**Authors:** Bushra Saeed, Muhammad Zia-ur-Rehman, Syed Omer Gilani, Faisal Amin, Asim Waris, Mohsin Jamil & Muhammad Shafique  
**Impact Factor:** 1.711
  
- 6- **Title:** Acute Effects of Aerobic Exercise on Somatosensory-Evoked Potentials in Patients with Mild Cognitive Impairment  
**Journal:** Brain Sciences (Sept 2020)  
**Authors:** Imran Amjad, Imran Khan Niazi, Hamza Ghazanfar Toor, Rasmus Bach Nedergaard , Muhammad Shafique, Kelly Holt, Heidi Haavik, Touqeer Ahmed  
**Impact Factor:** 3.332
  
- 7- **Title:** Eye & Voice-Controlled Human Machine Interface System for Wheelchairs Using Image Gradient Approach  
**Authors:** Saba Anwer, Asim Waris, Hajrah Sultan, Shahid Ikramullah Butt, Muhammad Hamza Zafar, Moaz Sarwar, Imran Khan Niazi, Muhammad Shafique, Amit N. Pujari  
**Journal:** Sensors (Sept 2020)  
**Impact Factor:** 3.275
  
- 8- **Title:** Construction and Analysis of a Novel Wearable Assistive Device for a Visually Impaired Person  
**Authors:** Shahid Akram,<sup>1</sup> Ali Mahmood,<sup>1</sup> Ihsan Ullah,<sup>2</sup> Muhammad Tahir Mujtabah,<sup>1</sup> Ali Bin Yasin,<sup>1</sup> Asif Raza Butt,<sup>1</sup> Muhammad Shafique,<sup>3</sup> and Sajjad Manzoor  
**Journal:** Applied Bionics and Biomechanics (Oct 2020)  
**Impact Factor:** 1.141
  
- 9- **Title:** Neuro-Fuzzy Control of Sit-to-Stand motion using Head Position Tracking  
**Journal:** Measurement and Control (July 2020)  
**Authors:** Samina Rafiq, Najmul Islam, M Shafique, A Mehmood

**Impact factor:** 1.49

**10-**

**Title:** Cartesian Control of Sit-to-Stand Motion Using Head Position Feedback

**Journal:** Applied Bionics and Biomimetics (Aug 2020)

**Authors:** Samina Rafique, M. Najam-ul-Islam, M. Shafique, and A. Mahmood

**Impact factor:** 1.141

- 11- **Title:** Antibacterial Activities Of Gold Nanoparticles Synthesized By Citrus Limonum Fruit Extract  
**Journal:** Pakistan Journal of Botany (2021)  
**Authors:** Haroon mahmood, syed babar hussain, asia nosheen, tariq mahmood, muhammad shafique, noaman ul-haq and anwar ul haq  
**Impact factor:** 0.972
- 12- **Title:** Performance Evaluation of Convolutional Neural Network for Hand Gesture Recognition Using EMG  
**Authors:** Asif, A.R.; Waris, A. Gilani, S.O.; Jamil, M.; Ashraf, H.; Shafique, M.; Niazi, I.K.  
**Journal:** *Sensors* (March 2020)  
**Impact Factor:** 3.302
- 13- **Title:** The effects of a single session of chiropractic care on strength, cortical drive, and spinal excitability in stroke Patients  
**Journal:** Nature's Scientific Reports (Feb 2019)  
**Authors:** Kelly Holt, Imran Khan Niazi, Rasmus Wiberg Nedergaard, Jens Duehr, Imran Amjad, Muhammad Shafique, Muhammad Anwar, Harrison Ndetan, Kemal Turker, and Heidi Haavik  
**Impact Factor:** 4.609
- 14- **Title:** Therapeutic effects of aerobic exercise on EEG parameters and higher cognitive functions in mild cognitive impairment patients  
**Authors:** Imran Amjad and Hamza Toor and Imran Khan Niazi and Hina Afzal and Mads Jochumsen and Muhammad Shafique and Kathryn Allen and Heidi Haavik and Touqeer Ahmed  
**Journal:** International Journal of Neuroscience  
**Impact Factor:** 1.848
- 15- **Title:** Detection of Alzheimer's Disease Based on Phase Synchronization Measures in EEG Signals.  
**Authors:** M. Fatima, A. Faraz, W. Azeem, M. Zaeem and M. Shafique  
**Journal:** Pakistan Journal of Science (Nov 2019)  
**Published:** The Pakistan Association for the Advancement of science
- 16- **Title:** Antibacterial activities of gold nanoparticles synthesized by Citrus limonum fruit extract  
**Authors:** Haroon Mahmood, Syed Babar Hussain, Asia Nosheen, Tariq Mahmood, Muhammad Shafique, Noaman UI-Haq and Anwar UI Haq  
**Journal:** Pakistan Journal of Botany (June 2021)  
**Impact Factor:** 0.825
- 17- **Title:** Effect of Occupational Therapy on Multi-Scale Entropy of sEMG in Cerebral palsy Children  
**Authors:** Mashal Fatima, Awais Shoukat, Moiz Ishtiaq, Usman Khan, Muhammad Shafique  
**Journal:** Pakistan Journal of Engineering and Technology  
**HEC Recognised:** Y category (Sept 2020)
- 18- **Title:** IoT Based Fall Detection System for Elderly Population in Pakistan  
**Authors:** Mashal Fatima, Hamza Khan, Hamza Nisar, Fazal Zehran, Muhammad Shafique  
**Journal:** Pakistan Journal of Engineering and Technology (Sept 2020)  
**HEC Recognised:** Y category

- 19- **Title:** Xbox 360 Kinect Cognitive Games Improve Slowness, Complexity of EEG and Cognitive Functions in Subjects with Mild Cognitive Impairment: A Randomized Control Trial.  
**Journal:** Games for Health Journal (April 2019)  
**Authors:** Imran Amjad, Hamza Toor, Imran Khan Niazi, Sana Pervaiz, Mads Jochumsen, Muhammad Shafique, Heidi Haavik, Touqeer Ahmed  
**Impact Factor:** 1.876
- 20- **Title:** The Effect of Time on EMG classification of hand motions in able-bodied and transradial amputees  
**Journal:** Journal of Electromyography and Kinesiology, Volume 40, June 2018, Pages 72-80  
**Authors:** Asim Waris, Imran Khan Niazi, Mohsin Jamil, Syed Omer Gilani, Kevin Englehart, Winnie Jensen, Muhammad Shafique, Ernest Kamavuako  
**Publisher:** Elsevier  
**Impact Factor:** 1.510
- 21- **Title:** Movement intention detection in adolescents with cerebral palsy from single-trial EEG  
**Journal:** Journal of Neural Engineering (2018)  
**Authors:** Mads Jochumsen, Muhammad Shafique, Ali Hassan, Imran Khan Niazi  
**Impact Factor:** 3.92
- 22- **Title:** Investigation of photoplethysmographic signals and blood oxygen saturation values on healthy volunteers during cuff-induced hypoperfusion using a multimode PPG/SpO2 sensor.  
**Journal:** Medical and Biological Engineering and Computing (MBEC), 50 (6), 575-583, June 2012.  
**Author:** Shafique M, Kyriacou PA, Pal SK.  
**Publisher:** Springer  
**Impact Factor:** 1.916
- 23- **Title:** Photoplethysmographic signals and blood oxygen saturation values during artificial hypothermia in volunteers.  
**Journal:** Physiological Measurement 33 (12), 2065, 2012  
**Author:** M Shafique and P A Kyriacou  
**Publisher:** IOP Publishing  
**Impact Factor:** 2.058
- 24- **Title:** Model Rate Equations for Semiconductor Quantum Dot Microcavity Laser, Published 13 January 2016.  
**Authors:** H B Naveed, S Popov and M Shafique  
**Publisher:** Laser Physics, Volume 26, Number 2  
**Impact Factor:** 1.328
- 25- **Title:** Design And Development Of An Efficient And Cost Effective ECG Simulator Capable Of Generating Normal And Pathological ECG Signals  
**Journal:** International Journal of Simulation, Systems, Science and Technology, 2018  
**Authors:** Muhammad Shafique, Ayesha Naeem  
**Publisher:** United Kingdom Simulation Society  
**Impact Factor:** 0.19
- 26- **Title:** Intelligent stick for visually impaired people, New Horizon, IEEEEP, Vol: 84-85, 2015, ISSN 222X-3659  
**Authors:** Umber Waraich, Muhammad Shafique, Qurat ul ain, Arsalan Habib  
**HEC Recognised:** Y category
- 27- **Book Chapter:** "Universal Matched-Filter Template Versus Individualized Template for Single Trial Detection of Movement Intentions of Different Tasks"; Muhammad Akmal, Mads Jochumsen, Muhammad Samran Navid, Muhammad Shafique, Syed Muhammad Tahir Zaidi, Denise Taylor and Imran Khan Niazi  
**Book Title;** Advances in Neural Networks, eBook ISBN: 978-3-319-33747-0, Series Volume: 4, 2016, Publisher: Springer International Publishing, Pages: 275-283



- 28- **Title:** Effect of aerobic exercise on electroencephalogram parameters and cognitive functions in patients with mild cognitive impairment  
XXII Congress of the International Society of Electrophysiology and Kinesiology, ISEK - Dublin, Ireland  
Duration: 30 Jun 2018 → 2 Jul 2018  
**Authors:** Imran Amjad, Hamza Ghazanfar Mehmood Toor, Imran Khan Niazi, Hina Afzal, Mads Jochumsen, Muhammad Shafique, Kathryn Allen, Heidi Haavik, Touqeer Ahmed
- 29- **Title:** The effects of a single session of spinal manipulation on strength and cortical drive in stroke patients.  
**Authors:** Kelly Holt, Imran Khan Niazi, Rasmus Wiberg Nedergaard, Jens Duehr, Imran Amjad, Muhammed Shafique, Harrison Ndetan, Heidi Haavik  
ACC-RAC Platform and poster presentation abstracts. Journal of Chiropractic Education: March 2017, Vol. 31, No. 1, pp. 29-83.
- 30- **Title:** Footwear Affects Biomechanical Work and Knee Adduction Moment during Stance Phase in Medial Knee Osteoarthritic Male Pakistani Adults  
**Authors:** Saad Jawaid Khan, Shafique Muhammad  
*Accepted in; 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'18) to be held at the Honolulu, HI, USA, July 17-21, 2018.*
- 31- **Title:** Investigating the Effect of Different Wavelength of Light on Heart Rate Variability and Perfusion Index  
**Authors:** Mashal Fatima, Hamza Zafar, M. Talha Sana, Muhammad Shafique  
*2018 2nd International Conference on Biomedical Engineering, Indonesia, Bali*
- 32- **Title:** Universal matched-filter template versus individualized template for single trial detection of movement intentions of different tasks  
25th Italian Workshop on Neural Networks (WIRN 2015), IIASS in Vietri sul Mare, near Salerno, Italy, 2015  
**Authors:** Muhammad Akmal, Mads Jochumsen, Muhammad Samran Navid, Muhammad Shafique, Syed Muhammad Tahir Zaidi
- 33- **Title:** A novel non-invasive trans-reflectance photoplethysmographic probe for use in cases of low peripheral blood perfusion.  
Engineering in Medicine and Biology Society, EMBC, 2009. Annual International Conference of the IEEE, pages; 1489-1492. USA.  
**Publisher: IEEE**  
Authors: Shafique M, Phillips JP, Kyriacou PA.
- 34- **Title:** Evaluation of a multimode photoplethysmographic sensor during cuff-induced hypoperfusion.  
Engineering in Medicine and Biology Society EMBC, 2010 Annual International Conference of the IEEE, pages; 1024-1027. Buenos Aires, Argentina.  
**Publisher: IEEE**  
Authors: Shafique M, Phillips JP, Kyriacou PA.
- 35- **Title:** Investigation of pulse oximeter failure rates during artificial hypoperfusion utilising a custom made multimode pulse Oximetry sensor.
- 36- Engineering in Medicine and Biology Society, EMBC, 2011 Annual International Conference of the IEEE, pages; 4352-4355. USA  
**Publisher: IEEE**
- 37- **Title:** Design and development of a new non-invasive trans-reflectance photoplethysmographic probe.  
Medical Physics & Engineering Conference 2009, Liverpool, UK

- 38- **Title:** Trapezius or facial muscles: Which one is more suitable for the measurement of stress using sEMG signals?  
Accepted for 42nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'20)  
**Authors:** Mashal fatima, Kashaf Gulzar, Kainat Raza Khan, Fatima Amjad, Muhammad Shafique
- 39- **Title:** Towards a Low Cost Brain-computer Interface for Real time Control of a 2 DOF Robotic Arm, International Conference on engineering technologies, ICET, IEEE Pakistan, 2015  
**Authors:** Mashal Fatima, M. Shafique, Z. H. Khan
- 40- **Title:** Pushing a Manual Wheelchair Requires More Muscular Force Than Pulling  
**Authors:** Hamza Toor, Saad Jawaid Khan, Hashir Iqbal, Maria Tahir, Bareera Amjad, Mafia Afzal, Juliana Usman, Muhammad Shafique, 2nd International Conference for Innovation in Biomedical Engineering and Life Sciences pp 43-47 (ICIBEL) 2017, Penang Malaysia.
- 41- **Title:** Feature Extraction of EEG Signals Using Wireless Data Acquisition System (accepted for the Journal of New Horizon, IEEE)

### Patents:

1. Patent Submitted: Mixing assembly with wavy grooves for use in ventilators
2. Another patent is ready for submission on flow sensor

### Papers submitted

- 42- **Title:** Evaluation of Windowing Techniques for Intramuscular EMG-based Diagnostic, Rehabilitative and Assistive Devices  
**Authors:** Hassan Ashraf, Asim Waris, Syed Omer Gilani, Muhammad Shafique, Imran Khan Niazi  
**Journal:** planning to submit to Biomedical Signal Processing and Control
- 43- **Title:** Pragmatic trial investigating effects of 4 weeks of spinal manipulation plus physical therapy Vs physical therapy alone, on motor function in stroke patients.  
**Authors:** Kelly Holt, Imran Khan Niazi, Imran Amjad, Muhammad Shafique, Jens Duehr, Heidi Haavik  
**Journal:** Ready for submission to Nature Scientific Report or JAMA Network Open
- 44- **Title:** Investigating effects of 4 weeks of spinal manipulation plus physical therapy Vs physical therapy alone, on recovery blood markers; BDNF, GDNF, IGF2.  
**Authors:** Kelly Holt, Imran Khan Niazi, Imran Amjad, Nitika Kumari, Muhammad Shafique, Jens Duehr, Heidi Haavik  
**Journal:** Nature Scientific Report
- 45- **Title:** Evaluation of a general purpose bioimage classification method for protein subcellular localization on Human Protein Atlas image database.  
**Journal:** Ready for submission to IEEE Transactions on Computational Imaging  
**Authors:** Muhammad Shafique, Hania Rehman

### MS Thesis Supervised

1. Thesis Title: Optimized Electroencephalogram Data Acquisition and Signal Processing for Real Time Brain Computer Interface and Alzheimer's disease Detection (Mashal Fatima) 2016

2. Thesis Title: Green Synthesis of Gold Nanoparticles for Cancer Diagnostics Applications  
(Babar Hussain) 2016
3. Thesis Title: Diagnosis of Alzheimer's disease using Slowness and Coherence of EEG Signals  
(Hamza Toor) 2017
4. Thesis Title: Iris Based Disease Recognition System  
(Umber Warraich) 2016
5. Thesis Title: Customized ECG simulator for use in medical manikin  
(Ayesha Naeem) 2017
6. Thesis Title: Design and development of an In-vitro human fertilization system for temperature regulation  
(Aneeqa Malik) 2017
7. Thesis Title; Design and control of Robotic Hand using tactile force sensors to control grasping of solid objects  
(Aleena Mazhar) 2018
8. Measurement and categorization of noise levels in Neonatal intensive care unit (NICU)  
(Qazi Saleem) 2018
9. Measurement of Venous Oxygen Saturation Using Multimode PPG  
(Mohammad Shoaib) 2018
10. Development of a Wireless Portable EMG Sensor for use during exercise  
(Mohammad Ashir Ansvari) 2018
11. Evaluation of a general purpose bioimage classification method for protein subcellular localization on Human Protein Atlas image database  
(Hania Rehman) 2019
12. Effect of nail polish on pulse oximeter reading in Pakistani population  
(Dawood Ahmad) 2019
13. Integration of Transmittance and Reflectance Mode Photoplethysmography to Enhance Signal Quality During Hypoperfusion  
(Arslan Ahmed 2020)
14. Improvement In Desgn Of The Blind Stick For The Visually Impaired Persons  
(Seemab Zakir 2021)
15. Feature Detection and Classification of Photoplethysmographic Signals  
(Abdullah Faraz 2021)
16. Analysis of PPG signals using Machine learning Algorithms  
(Shehzaib Shafique 2021)
17. Biomechanics Analysis Of Athletes Using Motion Capture Cameras  
(Usman Qamar Shaikh 2021)
18. Application of AI Algorithms for the Smart Detection of Obstacles in Blind Stick

(Qurat UI Ain 2021)

## Ph.D. Supervision

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Currently there are **five students** working under my supervision for PhD in Biomedical Engineering. Their general area of research is evaluation of rehabilitation techniques for patients suffering from neurological diseases using brain computer interfaces.