Dr. Alaa Helal

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Languages: English, French, Arabic (mother tongue).

Biography:

Dr. Alaa Helal is lecturer of Biomedical Engineering department. He received his B.Sc. from the Military Technical College, M.Sc. and Ph.D. from Biomedical Engineering department. The MSc thesis was "Design and Implementation of Smart Device for Drop Foot Treatment" which is a remarkable contribution in the field of prosthetic limbs for treatment of paralysis, especially POLIO and can be easily generalized to be used in stroke, spinal cord and head injury, amnesia, cerebral palsy, deep brain stimulation and multiple sclerosis. The PhD thesis was "Automatic Detection and Prediction of Epileptic Waveforms in EEG Signals" which is a wonderful contribution for predicting and detecting epileptic seizures before it spreads and develops as much as possible then, controlling and limiting epileptic seizures prevalence by stimulating the sympathetic nerve through specific impulses applied by a simple electrode placed behind the patient's earlobe using a closed feedback loop system. He started working at the Military Technical College, Air Defense College, Higher Institute for Engineering and Technology, Faculty of Engineering at Modern University for Technology and Information, (MTI), NAHDA University (NUB).

Member in:

- Egyptian Society of Engineering
- Engineering Syndicate
- IEEE
- Union of Arab Universities

Research interests:

My research interests include: Development of adapted electrical neuro- stimulation strategy based on understandings of neuronal activities for treatment of stroke, spinal cord and head injury, amnesia, cerebral palsy, deep brain stimulation and multiple sclerosis, Neuroimaging of Dementia and Alzheimer's disease, Brain-Computer Interface (BCI), Modeling of neural dynamics and brain activities, Sleep Disorders, Development of Artificial Limbs / Artificial Joints, (artificial knees, artificial pelvic

joints) using (Artificial Intelligence, Deep Learning, Machine Learning, Functional Electrical Stimulation (FES), and Neural Networking for Stimulating and activating peripheral nerves in patients with sclerosis), Design and implementation of smart devices for paralyzed patients' treatment using FES and BCI applications. Also my research interests comprehend Medical Imaging, Bio-signal Processing, Image Processing, Pattern Recognition, Feature Extraction and Process Optimization.

I have taught the following courses in several Faculties of engineering:-

A- Biomedical Engineering Courses:-

1. Medical Imaging
2. Biomechanics
3. Sensors in Medicine
4. Theory and Methodology of Technological Science
5. Signal Processing and Data Analytics in Biomedical Engineering
6. Simulation Methods in Medical Engineering
7. Statistics for Medical Engineering (CM2018) 7.5 credits
8. Medical Engineering, Basic Course

B- Electrical Communication systems Courses

1. Electric communications system
2. Mobile Communications
3. Optical Communications system
4. Satellite Communications system
5. Data Communication transmission
6. Signal and system analysis
7. Analogue Signal Processing
8. Digital Signal Processing
9. Communication Networks
10. Digital Networks
11. Information Engineering system

C- Electronics Courses

1. Introduction to Electronics
2. Electronic Circuits
3. Logic Circuits design
4. Optical Electronics
5. Programmable logic Devices
6. Computer Networks

Organizational Activities

1. Program Committee Member for" Application of quality engineering education system". In Obour Academy of Engineering and Technology - 2015
2. Program Committee Member for "development of communication Lab". In Obour Academy of Engineering and Technology - 2010
3. Program Committee Member for development of communication and Automation systems in Borg Al Arab –Airport Alex 2010
4. Program Committee Member for development of communication and Electronics Sector in Arab Academy for Training & Consulting in 2006
5. Program Committee Member for development ofcommunication and Automation systems in Sharm El Sheikh Airport 2006
6. Program Committee Member for development of communication and Automation systems in Cairo Airport 2003
7. Program Committee Member for development of communication and Automation systems in Huerghda Airport 2002

Training Courses

1. Advanced English Course Conversation Advanced – In Armed Forces Technical Institute for Language Education
2. Programmable Logic controller PLC (Introduction) – In Ennpi Center -Alex
3. DCS (Distributed Control System TDC 3000) overview– In Agent of HONEYWELL Company -Cairo
4. DCS (Distributed Control System TDC 3000) overview– In HONEYWELL Company center-Alex
5. Management information system (MIS) - In Ennpi Center -Cairo
6. Advanced English Course – In Faculty of Arts, Cairo University
7. Microcomputer Maintenance - BED Center EGYPT
8. Cathodic Protection system - PPC -EGYPT
9. General maintenance - PPC -EGYPT
10. Computer's Programs - CTC -EGYPT
11. Digital Microwave system- COLINS- EGYPT

Supervision of Projects (Under Graduation student)

1. Artificial Arm
2. Artificial Knees Simulator
3. Digital Communication System under water by using LASER- 2024
4. Analog Communication System 2023

5. Design Automation system for machine - 2018
6. Smart Home – 2016
7. Satellite Model 2015
8. Several Term Projects

Development of Training Courses

1. Maintenance system for Engineering
2. Electrical Standard concepts
3. Logic Circuit design
4. PLC
5. Communication networking's Design

Skills:

During my career, I have experienced programming using: Matlab, Python, C++, C#, java languages, Fieldtrip, EEGlab, Brainstorm and other related neuro-software applications. I have experienced different design and simulation programs (Multisim, Orcad, Proteus for electronic design and PCB generation), Finite Element Modeling. In addition to extensive experience of 3-D printed prototypes for medical devices, developing and maintaining databases of medical records and clinical (fMRI and EEG) data analyses, *t*-tests, ANOVA and Regression analyses for research evaluations.

Also I have hard and soft skills of:-

Presentation and communication: clarity, verbal communication, constructive feedback, and friendliness.

Adaptability and Leadership

Teamwork: conflict management, delegation, active listening, collaboration, coordination, idea exchange, and negotiating.

Problem-Solving: lateral thinking, logical reasoning, initiative, persistence, observation, negotiation, brainstorming, decision making.

Time Management: prioritizing, self-starter, planning, focus, delegation, stress management, coping, and organization.

Professional and Academic Experience:

- Evaluate student work, including tests and assignments based on departmental and curriculum requirements.
- Plan and deliver lectures to undergraduate and postgraduate students.
- Supervising and following up master and doctoral students and assisting them in publishing research and scientific papers.

- Maintain regularly scheduled office hours to serve as educational and information resource to students outside of classroom lectures.
- Evaluate and grade student in-class and laboratory work, assignments, papers and tests to ascertain subject understanding.
- Achieve proper use and maintenance of laboratory and academic equipment.
- Provide supervision and guidance to teaching and research assistants, assigning work to develop career skills.
- Design and execute research on optical emission spectroscopy and providing research assistantships to students and publishing findings in peer-reviewed journals.
- Inspect or evaluate workplace environments, equipment or practices to verify compliance with safety and quality standards.
- Prepare lessons and complementary course material such as syllabi, homework assignments and handouts.

Engineering Experience:

I have extended academic and research experience in different types of designs and simulation programs such as Proteus for electronic design, Implemented the latest technologies for biomedical engineering projects, Developed innovative solutions to improve medical equipment performance, Conducted research and development to create new medical devices, Bio-signal Processing, Image Processing, Advanced Mathematics and statistics, EEG Data Analysis and Bioinformatics.

Technical Experience:

- Conducts complete performance assurance and electrical safety testing.
- Performs preventive/scheduled maintenance on medical devices as required.
- May provide information for the development of testing protocols.
- Responds to medical equipment problems in clinical areas or research areas; evaluates, troubleshoots and corrects problems up to and including those requiring rule-based troubleshooting and a moderate level of diagnostic skill and having a moderate to high level of acuity and complexity.
- Determines the need to remove and/or replace malfunctioning medical devices from service and implements accordingly
- Performs equipment repairs of substantial difficulty to a level requiring generic test instrumentation or diagnostic software, e.g., to board or component level for electrical devices.
- Participates in medical equipment evaluations, installations and upgrades, including software revision.
- Instructs clinical and technical staff and other support personnel on the operation,

safe use, care and handling, and user maintenance procedures for medical equipment.

- Competence in repair of mechanical, electro-mechanical, electronic, and/or computer medical technology to sufficiently diagnose and repair medical devices and systems.
- Demonstrates interpersonal and communication skills to effectively work with team members and customers at all levels.
- Ability to perform testing and troubleshooting of medical devices involving specialized and generic test equipment and software diagnostic tools.
- Understands electrical and mechanical biomedical safety principles.
- Performs in a highly independent manner working within the broad scope of established department policies, procedures and goals.
- Ability to use hand and power tools safely and effectively.
- Ability to learn equipment maintenance, operating procedures, and repair procedures from training materials and courses.
- Ability to perform during routine, emergency, or other stressful situations.
- Ability to use computer-based tools at a moderate to high level, e.g., novel query of a database.
- Ability to teach other technical and clinical personnel.
- General knowledge of human physiology and biomedical instrumentation principles.

Journal Publications:

1- Helal A., Seddik, A., Eldosoky, M. and Hussein, A. (2014) "An Efficient Method for Epileptic Seizure Detection in Long-Term EEG Recordings". Journal of Biomedical Science and Engineering, 7, 963-972. doi: 10.4236/jbise.2014.712093.

2- Alaa Eldeen M. Helal, Ahmed Farag Seddik and Ayat Allah F Hussein. "A Hybrid Approach for Artifacts Removal from EEG Recordings". International Journal of Computer Applications 168(4):10-19, June 2017.

Conference Publications:

1- Alaa Eldeen Mahmoud Helal Helal. Automatic Detection of Epileptic Discharges in long EEG recordings". Journal of Neurological Disorders. Volume 6, p.85. Doi: 10.4172/2329-6895-C5-038.

2- Alaa Eldeen M. Helal. "Detection of Epileptic Spikes" In Proceedings of 4th Annual International Conference of Epilepsy & Treatment. August 29-30, 2018.Zurich, Switzerland.