Omar Elnaggar

Researcher · Educator · Engineer · Entrepreneur
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SUMMARY

A doctoral researcher with an avid interest in smart healthcare and machine learning, and pursuing a personal passion for teaching and learning. Aspired to a career where research and teaching meet at one sweet spot, and where I can demonstrate my growing management and entrepreneurial skills.

EDUCATION

Doctor of Philosophy in Mechanical, Materials and Aerospace Engineering   *2019-present*

UNIVERSITY OF LIVERPOOL

• Dissertation title: WEARABLE SENSING FOR NON-INVASIVE HUMAN POSE AND MOVEMENT ANALYSIS DURING SLEEP

• In collaboration with an orthopaedic consultant at Liverpool University Hospitals NHS Foundation Trust.

Master of Engineering in Mechatronic Engineering   *2015-2019*

UNIVERSITY OF NOTTINGHAM

• Best student award - rank 1/80

• First Class with Honours

• Dissertation title: VOLITIONAL CONTROL OF UPPER LIMB PROSTHESIS FOR REHABILITATION SERVICES

International Baccalaureate Diploma   *2013-2015*

AL-WAKRA INDEPENDENT SECONDARY SCHOOL FOR BOYS

• Ranked among the top 2% worldwide

Qatari High School Certificate   *2013-2015*

AL-WAKRA INDEPENDENT SECONDARY SCHOOL FOR BOYS

• Overall mark: 97%

AWARDS AND ACHIEVEMENTS

Winner of the "Build your own business 3" Pitch Contest (aka Launch £10,000 Programme)   *2021*

University College London

EPSRC Funded PhD Studentship   *2019*

University of Liverpool Doctoral Network in AI for Future Digital Health

Best Engineering Student Award   *2019*

IEEE Electronics Packaging Society Malaysia Chapter

Best Engineering Undergraduate Final Year Project - Finalist   *2019*

The Institution of Engineering and Technology (UK) and The Institution of Engineering (Malaysia)

Best Student in MEng in Mechatronic Engineering (Year 3) Award   *2017-2018*

The University of Nottingham

Greenbulb Energy Prize for Outstanding Performance: Control Systems Design   *2017-2018*

The University of Nottingham and Greenbulb Energy Pte. Ltd.

Dean's Excellence Scholarship Award   *2017-2018*

The University of Nottingham

Department Undergraduate Development Scheme   *2018*

The University of Nottingham

Certificate of Recognition: Mechatronic Engineering Course Representative   *2018*

The University of Nottingham

Certificate of Recognition: Mechatronic Engineering Course Representative   *2019*

The University of Nottingham

Department Undergraduate Development Scheme	*2016*
The University of Nottingham	
Freescale Cup Intelligent Car Competition - Finalist	*2016*
NXP Semiconductors	
High Achievers Scholarship Award	*2015-2016*
The University of Nottingham	
Government Excellence Sponsorship	*2013-2015*
Ministry of Education and Higher Education Qatar	
Certificate of Excellence	*2014*
Al-Wakra Independent Secondary School for Boys	
French Language DELF A1 Proficiency Exam - Top Scorers Award	*2014*
The French Council (Qatar)	
Certificate of Excellence	*2013*
Al-Wakra Independent Secondary School for Boys	

RESEARCH PUBLICATIONS

O. Elnaggar, F. Coenen, A. Hopkinson, L. Mason, and P. Paoletti, *One-Shot Learning Framework for Sleep Posture Augmentation and Analysis: In-Silico and Human Participant Case Studies*, Information Fusion, 2022 (*under review).*

O. Elnaggar, F. Coenen, A. Hopkinson, and P. Paoletti, *Perception of Sleeping Poses Using Extremity Limb Orientations*, BioMedEng21 Conference Proceedings, United Kingdom, 2021.

O. Elnaggar, F. Coenen, and P. Paoletti, *In-Bed Human Pose Classification Using Sparse Inertial Signals*, 40th International Conference on Innovative Techniques and Applications of Artificial Intelligence, Springer, Cham, 2020.

O. Elnaggar, F. Coenen, and P. Paoletti, *Wearable Sensing For Non-invasive Human Pose Recognition During Sleep*, AI for Future Digital Health Workshop, SGAI 40th International Conference on Artificial Intelligence, 2020.

O. Elnaggar, and R. Arelhi, *A New Unsupervised Short-Utterance based Speaker Identification Approach with Parametric t-SNE Dimensionality Reduction*, International Conference on Artificial Intelligence in Information and Communication (ICAIIC), Japan, 2019.

O. Elnaggar, and R. Arelhi, *An Unsupervised Speaker Identification Approach: A Breakthrough 3D Visualization of High Dimensional Features*, 21st International Conference on Artificial Intelligence and Pattern Recognition (ICAIPR), Singapore, 2019.

TEACHING PUBLICATIONS

O. Elnaggar, and R. Arelhi, *Game-based Learning in Engineering Education: How can we reconcile seemingly conflicting interests of students, academics, universities and national policy makers?*, BERA (British Educational Research Association) Conference, United Kingdom, 2022.

O. Elnaggar, and R. Arelhi, *Design and Development of Game-based Learning for Virtual Engineering Laboratories: Two Case Studies*, AdvanceHE Teaching and Learning Conference, United Kingdom, 2022.

O. Elnaggar, and R. Arelhi, *Quantification of Knowledge Exchange Within Classrooms: An AI-based Approach*, 9th European Conference on Education, United Kingdom, 2021.

EMPLOYMENT HISTORY

VirLaber Ltd	*08/2021 - Present	Dubai*

Founder and Technical Director

- Established collaborations with academics in and out of UK to help them improve their quality of teaching.

- Led the development of a number of virtual labs for Engineering and Computer Science modules.

- Won a national judged pitching contest in the UK.

Mindset Spinoff   *09/2021 - Present | England*

Co-founder and Content Creation Director (Project Initiative)

- Employed a team of enthusiasts talented in the field of Media Production.
- Managed the production of creative digital content on education and self-development topics.

The University of Sheffield   *01/2021 - Present | England*

Graduate Research Associate

- Joined a university-wide research project on the curriculum design and delivery of engineering programmes.
- Proposed a novel pedagogical framework to stimulate student-to-student interaction and knowledge exchange.
- Employed machine learning to assess, qualitatively and quantitatively, the efficacy of pedagogical frameworks.
- Supervised a team of four interns to design and incorporate Game-based Learning in Engineering Education.
- Published and presented first-authored papers at leading teaching and learning conferences.

Contact: *Dr. Roselina Arelhi - R.Arelhi@sheffield.ac.uk*

The University of Liverpool   *09/2020 - Present | England*

Graduate Teaching Assistant

- Taught undergraduate students on three programmes: mechanical, aerospace and civil engineering.
- Delivered both face-to-face and online teaching sessions.
- Demonstrated practical sessions for engineering modules (nearly 40 laboratory sessions a year).
- Marked student' work using published assessment criteria and provided them with feedback on their progress.

Contact: *Dr. Riaz Akhtar - R.Akhtar@liverpool.ac.uk*

Intel   *06/2017 - 09/2017 | Malaysia*

Static Timing Analyst (Intern)

- Performed full chip timing execution tasks.
- Debugged several issues in the result and flow.
- Developed scripts to automate many of the computationally intensive tasks.

Contact: *Mr. Ashish Goel - ashish.kumar.goel@intel.com*

Motorola Solutions & The University of Nottingham   *06/2016 - 08/2016 | Malaysia*

Control Systems Engineer (Trainee)

- Designed and produced a fully functional Anti-lock Braking System (ABS) for automobiles.
- Tested the system in various real driving scenarios.

Contact: *Dr. Kevin Lee -* 🔗 *LinkedIn Profile*

TECHNICAL SKILLS

ARTIFICIAL INTELLIGENCE	Data Augmentation	Data Analytics	Natural Language Processing	Deep Learning
PROGRAMMING	C/C++/C#	MATLAB & SIMULINK	Python	TensorFlow & PyTorch	HTML & CSS
EMBEDDED SYSTEMS	Wearable Sensors	(Mixed-signal) PCB Design	Sensor Fusion Algorithms
SOFTWARE DEVELOPMENT	UI/UX Design	Sequential/Parallel Processing	Web Development
COMPUTER SKILLS	Windows & Unix OS	2D/3D CAD	Game Development (3D modelling & animation)
AUTOMATION & MANUFACTURING	Programmable Logic Controllers	Subtractive & Additive Manufacturing Processes

HIGHLIGHTED PROJECTS

Handmade Smart Socks for Activity Recognition   *2022 - Present*

UNIVERSITY OF LIVERPOOL

- Designed washable pressure-sensitive smart socks purely made of electronically-active yarns (e-textile).
- Developed the socks using low-cost processes, such as handmade crochet and knitting.
- Designed and fabricated a small-sized wearable embedded system for sensor data acquisition and transmission.
- Developed an algorithm for step detection and basic activity recognition.

Design and Evaluation of Knowledge Exchange in Undergraduate Classrooms *2020 - 2021*
UNIVERSITY OF SHEFFIELD & UNIVERSITY OF LIVERPOOL

• Designed a framework for a group assignment for an engineering module, cultivating knowledge exchange.

• Produced AI-based visualisations of students' knowledge before and after taking the group coursework.

• Recommended evidence-based approaches to foster knowledge exchange in classrooms.

Wearable Sensing for Non-invasive Human Pose Classification During Sleep *2019 - Present*
UNIVERSITY OF LIVERPOOL

• Formulated the clinical problem in collaboration with an orthopaedic consultant at Aintree University Hospital.

• Conducted virtual sleep experiments leveraging on digital 3D animation software.

• Proposed novel algorithms for human body pose tracking during sleep.

• Developed custom-made wearable sensors for in-bed human motion analysis.

• Invited human participants to clinical trials for validating the proposed algorithms.

Volitional Control of Upper Limb Prosthesis for Rehabilitation Services *2018 - 2019*
UNIVERSITY OF NOTTINGHAM

• Developed a muculoskeletal model of the human upper limb and simulated it under dynamic movements.

• Additively manufactured a controllable biomimetic prosthetic limb.

• Applied machine learning for the decoding of non-invasive EMG signals to recognise prosthetic movements.

• Implemented a closed-loop feedback control system to regulate the prosthetic movements.

Speaker Recognition Using Short Incoherent Speech for Health Emergencies *2017 - 2018*
UNIVERSITY OF NOTTINGHAM

• Proposed a novel short-utterance speaker identification algorithm using parametric dimensionality reduction.

LANGUAGES

Arabic	English	French
Native Proficiency	Full Working Proficiency	Basic

INVITED TALKS

Guest Lecture: Sensors and Actuators in Robotic Systems *02/2022*
University of Sheffield

• Presented the different types of robot sensors: proprioceptive, exteroceptive, passive and active sensors.

• Presented common actuator options in robotics: electrical, pneumatic, hydraulic and soft actuators.

• Discussed uncertainty of sensor measurements, sensor fusion techniques, and Bayesian decision making.

• Provided students with an overview of the legal and ethical implications of robotics.

Guest Speaker: Engineering Employability Week *03/2021*
University of Liverpool

• Shared my experience as a PhD student and presented post-PhD career pathways.

Guest Lecture: Stochastic Processes *12/2020*
University of Sheffield

• Lectured a class of 120 undergraduate students on the probability theory behind stochastic processes.

Guest Speaker: Final Year Project Sharing *11/2018*
University of Nottingham

• Gave an eye-opening talk to undergraduate engineering students on the applications of AI in signal processing.

• Shared tips on how to ace the final year project.

EXTRA-CURRICULAR ACTIVITIES

Academics Across The Globe Initiative *2020-present*
UNIVERSITY OF LIVERPOOL & UNIVERSITY OF NOTTINGHAM
- Founded an online LinkedIn group which brings together academics and early-career researchers.
- Co-administer the group to assist members in navigating their career pathways, and forming collaborations.

University-wide Green Initiative *04/2021-10/2021*
UNIVERSITY OF LIVERPOOL
- Designed, built and installed vertical hydroponic systems around the campus to push the sustainability agenda.

Specialised Virtual Engineering Labs *2020-present*
UNIVERSITY COLLEGE LONDON, UNIVERSITY OF SHEFFIELD & UNIVERSITY OF LIVERPOOL
- Took the initiative to address the lack of well-established digital platforms for engineering practicals.
- Formed a team of developers with expertise in immersive digital environments.
- Capitalised on game development and gamification to create virtual labs for a better learning experience.
- Received positive feedback from academics at The University of Nottingham and The University of Sheffield.

Entrepreneurship Course: Build your own business 3 *07/2021 - 08/2021*
UNIVERSITY COLLEGE LONDON
- Won a pitch contest alongside other London students and graduates.
- Realised the process of launching a business through interactive workshops and one-to-one mentoring support.
- Grasped the different aspects of Intellectual Property, legal matters and startup financing.

Entrepreneurship Course: Build your own business 2 *05/2021 - 06/2021*
UNIVERSITY COLLEGE LONDON
- Recognised the tools needed to test the viability of a business idea and develop a business plan.
- Learnt the principles of identifying potential markets and target customer segments.

Self-learning: System Identification and Parameter Estimation *2018*
DELFT UNIVERSITY OF TECHNOLOGY

Self-learning: Bio Mechatronics *2018*
DELFT UNIVERSITY OF TECHNOLOGY

Intern Training Course Package *2017*
INTEL
- Privacy Essentials.
- Data Leaks Avoidance.
- Information Security Awareness.
- Export Compliance Written Assurance.

edX Course: Introduction to C++ *2016*
MICROSOFT CORPORATION

CS4 Qatar for Robotics *2015*
CARNEGIE MELLON UNIVERSITY

First Aid Training *2015*
QATAR CENTRE FOR VOLUNTARY ACTIVITIES

Debate Course *2014*
GEORGETOWN UNIVERSITY

Organising Committee Member for the Following Events:
ROBOTICS SOCIETY, THE UNIVERSITY OF NOTTINGHAM
- Arduino workshops for undergraduate students, *2015*

THE YOUTH COMPANY, QATAR
- *"Run the World"* Festival, *2014*

MINISTRY OF CULTURE AND SPORTS, QATAR
- Qatar's Sports Day, *2014*

AL-WAKRA INDEPENDENT SECONDARY SCHOOL FOR BOYS, QATAR

• UK Universities Exhibition, *2014*

QATAR CENTRE FOR VOLUNTARY ACTIVITIES

• Volunteer's International Day, *2014*

Participant in the Following Activities:

INTEL

• Intel Cycling Ride (Silver Medal), *2017*

THE UNIVERSITY OF NOTTINGHAM

• Life Cycle Malaysia 3 (20-Km Charity Ride), *2016*

QATAR FOUNDATION & THE THIMUN FOUNDATION

• Model United Nations (THIMUN), *2015*

AL-WAKRA INDEPENDENT SECONDARY SCHOOL FOR BOYS, QATAR

• School's Scout Team (camping, desert greening, etc.), *2013-2015*

QATAR KARATE FEDERATION

• Qatar's Karate Cup (Silver Medal), *2013*

REFERENCES

Dr Paolo Paoletti
Senior Lecturer

Department of Mechanical, Materials and Aerospace Engineering

School of Engineering

The University of Liverpool

Brownlow Hill

Liverpool L69 3GH

United Kingdom

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Prof Frans Coenen
Professor

Department of Computer Science

School of Electrical Engineering, Electronics and Computer Science

The University of Liverpool

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Liverpool L69 3BX

United Kingdom

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Faculty of Engineering

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