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Education and Employment

2022 – present **Postdoctoral Research Associate, Department of Medicine & Department of Engineering, University of Cambridge, UK**
Member of the ADVANTAGE research consortium
Supervisor: George Malliaras

ADVANTAGE is part of the UK's Advanced Pain Discovery Platform. The Cambridge consortium focuses on painful or (unexpectedly) painless visceral diseases and disorders, with expertise in cell genetics, behavioural systems and methods; and is linked to industry, including Eli Lilly and AstraZeneca. Activities include:

- Configuring and administering specialized tools (software and hardware) required for quantitative neural and autonomic sensory testing in healthy volunteers and hospital patients.
- Developing systems to detect, acquire, store and analyse patient health data, in order to dynamically classify their response and correlate it with their pain levels.
- Developing ML-powered solutions (on-device and cloud-based) to better classify pain and create patient profiles to improve pain prevention and treatment.

2023 – present **Postdoctoral By-Fellow, Churchill College, University of Cambridge, UK**

Receiving its Royal Charter in 1960, Churchill College, is the national and Commonwealth memorial to Sir Winston Churchill. It is the embodiment of his vision of how higher education can benefit society in the modern age. Postdoctoral By-Fellows contribute to a significant community of postdocs among the Churchill Fellowship

2018 – 2022 **Doctoral Degree, Korea Advanced Institute of Science and Technology – KAIST, Korea**
Research Assistant at the Integrated Organic Electronics Laboratory
Supervisor: Seunghyup Yoo

Research funds and living expenses secured through the Attachable Photo Therapeutics Centre for e-Healthcare, Ministry of Science and ICT of Korea. Involved in projects such as:

Wearable Cardiac Sensor Patch for Biopotential Measurement, where activities included:

- Developed biocompatible micro-structured dry electrodes for bioelectric potentials
- Designed the circuitry necessary for close-to-heart ECG and PPG measurements
- Implemented a mobile application to display ECG, PPG and derived calculated measurements in real-time from a close-to-heart sensor

See-through Phototherapy Platform for Circadian Rhythm Sleep Disorders, where activities included:

- Developed a transparent light waveguide based on holographic gratings ready to mount on regular glasses
- Analysed and optimized a plane-to-point waveguide to increase the luminance of an OLED source

2016 – 2018 **Master's in Engineering Degree, Korea University, Korea**
Research Assistant at the Display and Nanosystems Laboratory
Supervisor: Byeong-Kwon Ju

Research funds secured through the collaboration with Samsung Display. Living expenses funded by the Global Korea Scholarship.

Thesis in Electron Injection in Alkali Metals for Organic Light Emitting Diodes, where different alkali metal compounds were characterized as efficient electron injection materials in OLED devices.

- 2006 – 2013 **Bachelor's in Engineering Degree, Armed Forces University – ESPE, Ecuador**
Research Intern at the Computer Integrated Manufacture Laboratory
Supervisor: Alejandro Chacón
- Participated in the Refurbishment of the Automation and Remote Operation of Industrial Process Control Station. Other activities included:
- Developed a small-scale SCADA system for the manufacture stations in the laboratory
 - Used internet2 to remotely operate the CIM stations in collaboration with the Monterrey Institute of Technology and Higher Studies
 - Robotics Club founders' group
- 2000 – 2006 **Sebastián de Benalcázar High School, Ecuador**
- IB Diploma Candidate. HL certifications in Physics and SL certifications in Math and Chemistry. Other activities included:
- National Maths Contest 2005, Senior Category: Top 5

Awards and Scholarships

- 2018 **Doctoral Research Scholarship, Department of Electrical Engineering, KAIST**
Elected by the governing body of the Department for academic excellence. Awarded 4 years full-time travel/living support for Doctoral degree studies.
- 2014 **Global Korea Scholarship**
1 in 6 awards for the 2014 program elected by the Ministry of Education of Korea. Awarded 3 years full-time travel/living support for Korean language training and master's degree studies.
- 2010 **ITESM Travel Award for Exchange Program**
Elected by the International Outreach Department of the Armed Forces University - ESPE. Awarded tuition and travel expenses for one exchange term at the Monterrey Institute of Technology and Higher Education, Mexico.

Teaching Experience

- 2022 – present **Associated Lecturer, Nanoscale Engineering, The Open University, United Kingdom**
Delivering the 'Part 3: Health' lectures for the Nanoscale Engineering Course. Providing support and grading of TMA and EMA evaluations for the course.
- 2022 – present **Lecturer, Intelligent Systems, Universidad de las Américas, Ecuador**
Developed the course outline and currently teaching at the Artificial Intelligence Online Master's Program.
- 2012 – 2013 **Laboratory Assistant, Computer Integrated Manufacture, University of the Armed Forces – ESPE, Ecuador**
Supported the CIM Lab students with the PLC programming and HMI design for the course capstone project.
- 2011 **Laboratory Assistant, Mechatronics Instrumentation, University of the Armed Forces – ESPE, Ecuador**
Developed laboratory experiments for undergraduate students about sensor modelling and data acquisition with LabVIEW.

Publications and Conferences

Alban, M.V., Moon, H. and Yoo, S. (2022). Wearable Cardiac Sensor Patch for Wireless Biopotential Measurement. IEEE Transactions on Biomedical Circuits and Systems. In Preparation.

Alban, M.V., Lee, H., Moon, H. and Yoo, S. (2021). Micromolding Fabrication of Biocompatible Dry Micro-Pyramid Array Electrodes for Wearable Biopotential Monitoring. IOP Flexible and Printed Electronics, <https://doi.org/10.1088/2058-8585/ac3561>

Lee, H., Lee, W., Lee, H., Kim, S., **Alban, M.V.**, Song, J., Kim, T., Lee, S. and Yoo, S. (2021). Organic–Inorganic Hybrid Approach to Pulse Oximetry Sensors with Reliability and Low Power Consumption. ACS Photonics, <https://doi.org/10.1021/acsphotonics.1c01161>

Alban, M.V., Lee, H., Moon, H. and Yoo, S. Biocompatible Microneedle Array Dry Electrodes for Bioelectric Potentials Measurement in Organic-Electronic Wearable Health Monitoring Applications. Best Poster Award Nominee at MRS Fall 2019, Boston, USA, 2019.

Alban, M.V., Lee, H., Moon, H. and Yoo, S. Flexible and Fully Biocompatible Microneedle Array Dry Electrodes for Bio Potentials Measurement in Organic Electronic Wearable Healthcare Applications. Poster presentation delivered at Electronic Materials and Nano Technology for Green Environment ENGE 2018, Jeju, Korea, 2018

Alban, M.V., Choi, J., Jung, S.G., Shim, Y.S., Park, Y.W., and Ju, B.K. Comparative study of different alkali metal compounds as efficient electron injection materials in OLED devices. Best Poster Award at the Workshop on Photophysics and Nanomaterials WONPHYS 2017, Varadero, Cuba, 2017.

Invited Talks and Presentations

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| July 2022 | Embassy of the Republic of Korea in Ecuador
Presented the academic experience and research results after the competition of the Korean Government Scholarship. Talk generated contacts and interest for future GKS scholars. |
| February 2020 | San Francisco de Quito University – USFQ, Ecuador
SWIFT Talk. Presented briefly my work and how the school can benefit from the skill transfer of Korea-trained researchers. The talk generated the first contact towards a collaboration MOU between USFQ and KAIST. |
| February 2020 | Armed Forces University – ESPE, Ecuador
Invited to give a <i>Masterclass</i> on Organic Electronics to professors and senior students at the School of Engineering. The talk generated interest in collaboration for the fabrication of low-cost organic electronics in developing countries. |

Outreach

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| 2019 – 2020 | Electrical Engineering International Students Council, KAIST, Daejeon, Korea
Council Head. Organized events for the international community of students in KAIST campus. |
| 2017 – 2018 | School of Engineering International Students, Korea University, Seoul, Korea
Vice-President. Organized events for the international community of students in Korea University campus. |
| 2017 – 2018 | Ecuadorian Residents in Korea Association, Seoul, Korea
Co-Founder and President. Collaborated with the organization of the legal framework for the Foundation to be recognized by the Korean Government, as well as represented the Ecuadorian community in community events. |
| 2010 | Monterrey Institute of Technology and Higher Studies, Monterrey, Mexico
Exchange Student. Tuition and travel expenses funded by the ITESM Travel Award for Exchange Program elected by the International Outreach Department of the Armed Forces University – ESPE. |

Professional Associations

Materials Research Society, Student Member
IEEE, Graduate Student Member

Research and IT Skills

- Fluency in English and Spanish languages. Proficiency in Korean language. Basic understanding of Japanese and Portuguese languages

- Analytical, collaborative, and results-driven post-doctoral researcher with demonstrated research expertise in electronic and biomedical device design and manufacture. With strong communication, presentation and documentation skills
- Expertise with electronic/electromechanical/mechatronic systems, sensors/signal processing and communication protocols
- Experimental Techniques: Photolithography, Furnace Annealing, Plasma Treatment, Sputtering, Thermal Evaporator, SEM, AFM, Surface Profiler
- Strong Computer Assisted Design skills: SolidWorks, AutoCAD, Inventor, COMSOL for FEA simulation. Electronic Design and Analysis skills for PCB fabrication: Eagle and Proteus Suite
- Computer Skills: Linux/Windows, Office, HTML, LaTeX, C/C++, Java, Python, LabView, MATLAB, etc.

References

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