Marco Vinicio Alban-Paccha, PhD

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Education and Employment

2022 – present **Postdoctoral Research Associate, Department of Medicine, University of Cambridge, UK**
Member of the ADVANTAGE research consortium
Supervisor: Dr Michael Lee

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.

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

Research funds secured through the Attachable Photo Therapeutics Center 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 in Engineering Degree, Korea University, Korea**
Research Assistant at the Display and Nanosystems Laboratory
Supervisor: Prof. Byeong-Kwon Ju

Research funds secured through the collaboration with Samsung Display.

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 in Engineering Degree, Armed Forces University – ESPE, Ecuador**
Research Intern at the Computer Integrated Manufacture Laboratory
Supervisor: Prof. Alejandro Chacon

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 Champion, Senior Category

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 **Lecturer in Intelligent Systems – Universidad de las Americas, Ecuador**
Developed the course outline and taught at the Artificial Intelligence Online Master's Program.

2012 – 2013 **Lab Assistant in Computer Integrated Manufacture – Armed Forces University – ESPE, Ecuador**
Supported the CIM 200 students with the PLC programming and HMI design for the course capstone project.

2011 **Lab Assistant in Mechatronics Instrumentation – Armed Forces University – 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

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 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 *Masterclass* on Organic Electronics to professors and senior students of the School of Engineering. The talk generated interest in collaboration for the fabrication of low-cost organic electronics in developing countries.

Outreach

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.