Marco Vinicio Alban-Paccha, PhD
Cambridge, United Kingdom, CB3 1AR
ma2035@cam.ac.uk
LinkedIn Google Scholar ORCID

Education and Employment

2022 – present **Postdoctoral Research Associate**
Department of Medicine & Department of Engineering, University of Cambridge, Cambridge, UK
Bioelectronics Laboratory. Leader: Prof George Malliaras

Running independent research projects in two separate topics:
Application of wearable electronics and mobile apps to understand visceral pain as part of the ADVANTAGE consortium, part of the UK's Advanced Pain Discovery Platform, tasks include:

- Configuring and administering specialized tools (software and hardware) required for quantitative physiological measurements 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.

Development of an Organic Electrochemical Transistor-based platform for multi-analyte sweat sensing:

- Designing and characterising OECT-based biosensors adequate to measure small molecules, ions and enzymes.
- Integrating the biosensors with corresponding signal analysis electronics as well as communication and power modules.

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

2022 – present **Associate Lecturer**
The Open University, Milton Keynes, UK
Faculty of Science, Technology, Engineering and Mathematics

Associate Lecturers support students in STEM in the following ways:

- Delivering correspondence tuition and feedback to help with learning and assessment preparation
- Offering academic support through face-to face, email, telephone or other e-teaching methods
- Identifying student needs whether for additional support or advice and guidance
- Developing student study skills, including transferable skills related to employability
- Monitoring student progress, encouraging engagement in tutorial activities and field work where appropriate

2018 – 2022 **Doctoral Degree in Electrical Engineering**
Korea Advanced Institute of Science and Technology – KAIST, Daejeon, Korea
Integrated Organic Electronics Laboratory – IOEL. Leader: Prof 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 two research topics:
Wearable Cardiac Sensor Patch for Biopotential Measurement:

- 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:

- 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 light source

2016 – 2018 **Master's in Engineering Degree in Micro/Nano Systems**
Korea University, Seoul, Korea
Display and Nanosystems Laboratory – DIANA. Leader: Prof Byeong-Kwon Ju

Research funds secured via the collaboration with Samsung Display. Living expenses funded by the Korean Government through 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 Degree in Mechatronics Engineering**
Armed Forces University – ESPE, Sangolquí, Ecuador
Final Year Project at the Computer Integrated Manufacture Laboratory – CIM. Leader: Alejandro Chacón

Developed a small-scale SCADA system and documentation for the manufacture stations in the laboratory. Final Project involved the use of internet2 to remotely operate the laboratory manufacturing stations in collaboration with the Monterrey Institute of Technology and Higher Studies.

2010 **Visiting Exchange Student**
Monterrey Institute of Technology and Higher Studies, Monterrey, Mexico

2000 – 2006 **Sebastián de Benalcázar High School, Quito, Ecuador**
IB Diploma Candidate. Certifications in Physics HL, Mathematics SL and Chemistry SL.

Teaching

2022 – present **Nanoscale Engineering, The Open University**
Delivering the 'Part 3: Health' lectures for the Nanoscale Engineering Course. Providing support and marking of TMA and EMA evaluations for the course.

2023 – present **The Engineering Project, The Open University**
Providing support and marking of TMA and EMA evaluations for the course of 8 students working on Nanoscale Engineering Projects in preparation for Graduation.

2023 – present **Part IA Computing Supervisions, Homerton College**
Supervising all first year Engineering students at Homerton College (22 students for 2023). Supervision is the University of Cambridge name for small group tutorials.

2022 **Intelligent Systems, Universidad de las Américas – UDLA, Ecuador**
Developed the course outline and lecture presentations for the Artificial Intelligence Online Diploma Program.

2012 – 2013 **Laboratory Assistant, Computer Integrated Manufacture, University of the Armed Forces – ESPE**
Supported the CIM Lab students with the PLC programming and HMI design for the course's Capstone Project.

2011 **Laboratory Assistant, Mechatronics Instrumentation, University of the Armed Forces – ESPE**
Developed laboratory experiments for undergraduate students about sensor characterisation and data acquisition with LabVIEW.

Publications and Conferences

1. **Alban-Paccha, M.V.**, Gatecliff, L., Kissovsky, S., Serrano, R. R-M., Keene, S. T., Han, S. and Malliaras, G. G. (2023). Multimodal Wearable Electrochemical Sensor Platform for Ion and Enzyme Analysis. Nature Electronics. In Preparation.
2. **Alban-Paccha, M.V.**, Moon, H. and Yoo, S. (2023). Wearable Cardiac Sensor Patch for Wireless Biopotential Measurement. IEEE Transactions on Biomedical Circuits and Systems. In Preparation.
3. **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
4. 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
5. **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.
6. **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

7. **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.

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, selected 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.

2005 **National Mathematics Competition**
Senior Category: Top 5

Invited Talks and Presentations

July 2023 **Addenbrooke's Hospital, Cambridge, UK**
Presented the ADVANTAGE consortium research work on wearables and mobile apps for visceral pain to an audience of 50, including NHS clinicians. Talk generated contacts and offers of collaboration with various clinical specialists.

June 2023 **KAIST, Daejeon, Korea**
Presented the ADVANTAGE consortium research work on wearables and mobile apps for visceral pain and plans for collaboration with the Department of Electrical Engineering of KAIST.

June 2023 **POSTECH, Pohang, Korea**
Presented my work and plans for collaboration with the Department of Materials Science & Engineering of POSTECH.

July 2022 **Embassy of the Republic of Korea in Ecuador, Quito, 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, Quito, 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, Sangolquí, Ecuador**
Invited to give a *Masterclass* on the topic of 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.

Service and Engagement

2023 – present **Churchill College, Cambridge, UK**
Mentor for postgraduate students at the College.

2023 – present **Flexible and Printed Electronics, Institute of Physics**
Peer-reviewer of papers for the journal.

2023 **IEEE International Conference on Flexible and Printable Sensors and Systems**
Peer-reviewer of papers for the conference.

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 Group, 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 Association to be recognized by the Korean Government, as well as represented the Ecuadorian community in community events.

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. 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/CSS/JS, LaTeX, C/C++, Java, Python, LabView, MATLAB, etc.