Marco Vinicio Alban-Paccha, PhD, FHEA

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Academic Professional Experience

2025 – present **Postdoctoral Research Associate**
Department of Engineering, University of Cambridge, Cambridge, UK
Bioelectronics Laboratory. Supervisor: Prof George Malliaras

Leading the translational development of a wearable device employing ML techniques for detecting biomarkers indicative of concussion and other neurological disorders. The project is conducted in collaboration with the Department of Clinical Neurosciences. Key responsibilities include:

- Developing and validating computer vision and sensor fusion algorithms to accurately identify clinical markers relevant for neurological diagnostics.
- Integrating sensor technology with optimized data acquisition, analysis, and low-cost wearable form-factors to ensure usability in diverse settings.
- Coordinating efforts between engineers, neuroscientists, clinicians, and technology transfer specialists.
- Managing intellectual property strategy and facilitating commercialization processes through collaboration with Cambridge Enterprise.

2022 – 2025 **Postdoctoral Research Associate**
Department of Engineering, University of Cambridge, Cambridge, UK
Bioelectronics Laboratory. Supervisor: Prof George Malliaras

Led the translational development of a wearable Organic Electrochemical Transistor (OECT)-based platform for multi-modal sweat sensing. Key responsibilities included:

- Designed and characterised OECT-based electrochemical sensors to measure ions and hormones.
- Integrated the electrochemical sensors with corresponding signal analysis electronics as well as communication and power modules and optimizing for low-cost.
- Structured the Intellectual Property of the electronics part of the project to facilitate global impact through open sourcing the technology, enabling adoption and further validation.

Department of Medicine, University of Cambridge, Cambridge, UK
Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK
Division of Anaesthesia. Supervisors: Prof Geoff Woods and Dr Nicholas Shenker

Led the wearable electronics and mobile apps arm of the ADVANTAGE study to understand visceral pain, as part of the ADVANTAGE pain consortium within the UK's Advanced Pain Discovery Platform. Key responsibilities included:

- Managed the acquisition, storage, and allocation of the data from all sites as the **Study Data Manager**.
- Configured and administered specialized tools (software and hardware) required for quantitative physiological measurements in healthy volunteers and hospital patients.
- Developed ML-powered solutions (on-device and cloud-based) to detect, acquire, store, and analyse patient health data, to dynamically classify their response and correlate it with their pain levels.
- Led the preparation and submission of NHS Ethics applications through IRAS platforms, including writing Patient Information Sheets, Standard Operating Procedures, and Case Report Forms.
- Interacted with NHS patients to maximize the compliance of wearable sensor usage.
- Liaised with institutional legal teams in the NHS Trust and the University to establish intra-consortium agreements for the transfer of data, samples, and equipment.

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

Responsible for enhancing student learning experiences and outcomes through tailored academic support and mentorship. Key responsibilities include:

- Delivering clear and constructive tuition, personalized feedback, and academic guidance to support effective learning and assessment preparation.
- Identifying individual student needs, providing targeted advice, and facilitating additional academic support to ensure inclusive learning opportunities.
- Promoting and developing students' study skills, with an emphasis on transferable competencies essential for future employability.
- Monitoring and evaluating student progress, proactively encouraging active participation and engagement in tutorial activities and discussions.

2023 – present **Postdoctoral By-Fellow**
Churchill College, Cambridge, UK
Mentor for postgraduate students in the College, providing academic guidance, career advice, and personal support.

2023 – present **Faculty Mentor**
Cambridge Centre for International Research (CCIR), Cambridge, UK
Cambridge Future Scholar Programme and 1-on-1 Mentoring Programme

The Future Scholar Programme is an online research-focused programme for students. Tasks include:
- Providing lectures and supervision to students.
- Guiding students through the process of original research in their chosen discipline.
- Offering feedback on student work and progress, helping them to refine their research skills and understanding of the subject matter.

2022 **Lecturer**
Universidad de las Américas – UDLA, Ecuador
Artificial Intelligence Online Diploma Program

Education

2018 – 2022 **Doctor of Philosophy (PhD) Degree in Electrical Engineering**
Korea Advanced Institute of Science and Technology – KAIST, Daejeon, Korea
Integrated Organic Electronics Laboratory – IOEL. Supervisor: Prof Seunghyup Yoo

Wearable Cardiac Sensor Patch for Continuous Biopotential Measurement. Tasks 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. Tasks 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 light source.

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

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 **Engineer (BEng) Degree in Mechatronics**
University of the Armed Forces – ESPE, Sangolquí, Ecuador
Final Year at the Computer Integrated Manufacture Laboratory – CIM. Supervisor: Dr Alejandro Chacón

Developed a small-scale SCADA system and documentation for the manufacturing 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** (Monterrey, Mexico).

2014 – 2016 **Korean Language Student**
Pai Chai University, Daejeon, Korea

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

Teaching Experience

2022 – present **Lecturer, T366 Nanoscale Engineering, The Open University**
Coordinating and delivering the 'Part 3: Health' lectures for the Nanoscale Engineering Course (38 students between 2022–2024, 22 students for 2024–2025). Providing support and marking of regular evaluations for the course.

2023 – present **Lecturer, T452 The Engineering Project, The Open University**
Providing support and marking of regular evaluations for the project (12 students between 2023–2024, 8 students in 2025 working on Nanoscale Engineering Projects) in preparation for Graduation.

2022 – present **Supervisor, Part IA Computing, Homerton College, University of Cambridge**
Supervising all first year Engineering students at Homerton College (40 students between 2022–2024, 19 students in 2024–2025). *Supervision* is the University of Cambridge name for a small group tutorial.

2023 – present **Tutor, Nanoscale and Nanoengineering, CCIR**
Tutor, Sensors in Wearable Technology, CCIR
Mentor, 1-on-1 Program, CCIR
Designing courses to suit the needs and interests of advanced high school students, providing lectures and supervision, and teaching students the skills required for doing high-level independent research.

2023 – 2024 **Helper, Part IA Computing, University of Cambridge**
Supported all first year Engineering Tripos students at the University on Help Desk sessions (600+ students for Michaelmas terms between 2023–2024), as well as marking of the Computing course deliverables.

2022 **Lecturer, Intelligent Systems, Universidad de las Américas – UDLA, Ecuador**
Designed the course outline and lecture presentations for the Artificial Intelligence Online Diploma Program, the first of its kind in Ecuador.

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

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

Publications

Dr Alban-Paccha's publications are shown here, those available online, and those that have been submitted and are under review.

1. **Alban-Paccha, M.V.**, Shenker, N., Teran-Perez, J., Horne, A.W., Malliaras, G.G., Woods, C.G., and the ADVANTAGE Consortium (2024). *ADVANTAGE: Advanced Discovery of Visceral Analgesics by Neuroimmune Targets and the Genetics of Extreme human phenotype, a study protocol.* BMJ Open. Accepted.
2. Tao, X., Carnicer Lombarte, A., Dominguez Alfaro, A., Gatecliff, L., Zhang, J., Bidinger, S., Keene, S.T., Naegele, T.E., El Hadwe, S., Dong, C., Boys, A.J., Slaughter, C., Ruiz-Mateos Serrano, R., **Alban-Paccha, M.V.**, Kar-Narayan, S., and Malliaras, G.G. (2025). *Cleanroom-Free Toolkit for Integrating Submicron-Resolution Bioelectronics on Flexibles.* Small, https://doi.org/10.1002/smll.202411979
3. Serrano, R. R-M., Aguzin, A., Mitoudi-Vagourdi, E., Tao, X., Naegele, T., Jin, A., Lopez-Larrea, N., Picchio, M.L., **Alban-Paccha, M.V.**, Minari, R.J., Mecerreyes, D., Dominguez-Alfaro, A., and Malliaras, G.G. (2024). *3D Printed PEDOT:PSS-based Conducting and Patternable Eutectogel Electrodes for Machine Learning on Textiles*. Biomaterials, https://doi.org/10.1016/j.biomaterials.2024.122624
4. **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
5. 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

Conferences

1. Cullen, K.*, **Alban-Paccha, M.V.***, Woods, C.G., Malliaras, G.G., and Shenker, N. *Visually Understanding Chronic Visceral Pain: Results from the ADVANTAGE UK National Survey on Visceral Pain*. Poster presentation at the 2025 APDP Annual Conference, Newport, Wales, 3 June 2025.
2. **Alban-Paccha, M.V.**, Teran-Perez, J., Shenker, N., Woods, C.G., and Malliaras, G.G. *Wearable Sensors and Mobile App Data for the Modelling and Classification of Visceral Pain*. Oral presentation at the 17th International Symposium on Flexible Organic Electronics, Thessaloniki, Greece, 4 July 2024.

3. **Alban-Paccha, M.V.**, Teran-Perez, J., Shenker, N., Woods, C.G., and Malliaras, G.G. *Wearable Sensors and Mobile App Data for the Modelling and Classification of Visceral Pain*. Invited oral presentation at the 'Can Cancer be Detected Earlier by Employing Wearable Technologies?' symposium organised by the Early Cancer Institute and Precision Health Initiative, Cambridge, UK, 20th October 2023.
4. **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, November 2019.
5. **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
6. **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

April 2024 **University of Edinburgh, Edinburgh, UK**
Presented the talk "Wearable Sensors and Mobile App Data for the Modelling and Classification of Visceral Pain Flares" to an audience of 30, at the ADVANTAGE General Annual Meeting.

October 2023 **Early Cancer Institute, Cambridge, UK**
Presented the talk "Wearable Sensors and Mobile App Data for the Modelling and Classification of Visceral Pain Flares" to an audience of 50, at the "Can Cancer be Detected Earlier by Employing Wearable Technologies?" Workshop.

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 the ADVANTAGE consortium research work on wearables and mobile apps for visceral pain and plans for collaboration with the Department of Materials Science & Engineering of POSTECH. This culminated in the visit of Mr Seungjin Chai, doctoral student in POSTECH for a 6-month visit to Cambridge.

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. Briefly presented 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.

Funding

As an aspiring leader in research, Dr Alban-Paccha has been instrumental in forming and guiding research teams, generating original ideas, crafting proposals, and securing funding for projects. He has handled both the technical and administrative aspects of many applications, such as writing reports, arranging review meetings, and managing the budget for materials and supplies.

As Co-Investigator

2023 CAPE Grand Challenge – Systems and Devices for Healthcare 2023 (Malliaras, Alban-Paccha). Granted £50,000.00 for salary and research expenses by Haleon from 12/2023 to 05/2024. Wrote proposal and held multiple meetings with company representatives.

As Investigator and Data Manager

2022 – present MICA ADVANTAGE visceral pain consortium: Advanced Discovery of Visceral Analgesics via Neuroimmune Targets and the Genetics of Extreme human phenotype (Woods). £4,101,154.00 by the Medical Research Council as part of UK Research and Innovation from 06/2022 to 05/2026.

As Scholar

2018 – 2022 Attachable Photo Therapeutics Centre for e-Healthcare (Yoo). Granted tuition, salary and research expenses by the Ministry of Science and ICT of Korea from 03/2018 to 02/2022.

2014 – 2018 Korean Government Scholarship Program, now known as the Global Korea Scholarship (Alban-Paccha). Granted tuition and salary by the Ministry of Education of Korea from 09/2014 to 02/2018.

Student Guidance

As a Postdoctoral Research Associate, Dr Alban-Paccha has been a key mentor and collaborator for many students in Prof George Malliaras' group, ranging from undergraduates to visitors. He has not officially co-advised any of these students on their thesis and dissertations, but his influence and support are evident in their publications during their research appointments in the group. He has contributed to shaping the research directions, guiding the work, advising, and assisting students with experiments and data analysis throughout their research activities that led to those publications, where he is listed as a co-author. His guidance has been essential for achieving the educational mission and research goals of the group, and for helping the students advance their careers after their appointments or graduation.

Doctoral Candidates

2022 – present Luke Gatecliff. Project: OECT-based Ion Sensors for Athletics and Healthcare

2023 – present Christopher Slaughter. Project: Biopotential Gastric Movement Measurement Platform

4th Year Students (Master's degree Candidates)

2023 – 2024 Gemma Jacobson. Project: Cuffless Biopotential-Based Blood Pressure Estimation

Visitor Students/Researchers

2025 Cristiano Bortolotti, Polytechnic University of Milan, Italy

2023 Seungjin Chai, POSTECH, Korea

Training and Certifications

2025 **Fellow of the Higher Education Academy of the UK**
Recognized as a Fellow of the Higher Education Academy (FHEA) in the UK, a professional recognition that demonstrates a commitment to excellence in teaching and learning in higher education. This fellowship reflects a deep understanding of effective teaching practices, including curriculum design, student engagement, and inclusive education. It highlights a dedication to supporting student learning through evidence-based approaches and fostering an enriching educational experience.

2023 **EnterpriseTECH, Judge Business School, University of Cambridge**
The programme focuses on cultivating creativity, problem-solving abilities, and a growth mindset while exploring the commercial viability of innovative STEM-centred technologies.

Service and Engagement

2024 – present **PPI for Neurotech Initiative, Cambridge, UK**
Administrator and planner of coordination meetings and PPI panels with charities Parkinson's UK and McPin.

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 – present **Nanotechnology, Institute of Physics**
Peer-reviewer of papers for the journal.

2023 – 2024 **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 diverse events.

Research, IT and Other Skills

- **Languages**: Fluent in English and Spanish; proficient in Korean; basic understanding of Japanese and Portuguese.
- **Research and Collaboration**: Analytical, collaborative, and results-driven. Extensive experience in electronic and biomedical device design and manufacturing, with a strong focus on translational research. Skilled in communicating complex ideas effectively through presentations, technical documentation, and interdisciplinary collaboration.
- **Technical Expertise**: Advanced knowledge of electronic, electromechanical, and mechatronic systems. Proficient in designing and implementing sensors, signal processing techniques, communication protocols, and low-power electronic systems.
- **Experimental Techniques**: Hands-on experience with photolithography, furnace annealing, plasma treatment, sputtering, thermal evaporation, SEM, AFM, surface profiling, and electrochemical deposition.
- **Design and Simulation**: Strong Computer-Aided Design (CAD) skills with tools such as SolidWorks, AutoCAD, Inventor, and COMSOL. Expertise in electronic design, analysis, and PCB fabrication using Eagle, Altium Designer, and Proteus Suite.
- **Programming and Data Analysis**: Proficient in programming languages and tools including Python, C/C++, Java, LabVIEW, MATLAB, and LaTeX. Experienced in integrating embedded systems, developing algorithms for AI/ML applications, and analysing multimodal sensor data.
- **Software and Systems**: Skilled in Linux/Windows operating systems, Microsoft Office, and web technologies (HTML/CSS/JS). Familiar with smartphone app development and IoT integration for wearable and implantable devices.
- **Teaching and Mentorship**: Recognized as a Fellow of the Higher Education Academy (FHEA). Experienced in teaching engineering courses and supervising student projects. Skilled in creating engaging learning environments and mentoring diverse student groups.
- **Soft Skills**: Strong problem-solving abilities, adaptability, and creativity. Proven track record in delivering innovative solutions for complex challenges in research and development.