Marco Vinicio Alban-Paccha, PhD, FHEA, MEng, BEng

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Academic Professional Experience

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

Organic Electrochemical Transistor-based platform for multi-analyte sweat sensing. Tasks include:

- Designing and characterising OECT-based electrochemical sensors adequate to measure ions, hormones, and neurotransmitters.
- Integrating the electrochemical sensors with corresponding signal analysis electronics as well as communication and power modules and optimizing for low-cost.
- Managing the Intellectual Property of the project for potential future commercialization of the technology.

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

Wearable electronics and mobile apps to understand visceral pain at the ADVANTAGE pain consortium, part of the UK's Advanced Pain Discovery Platform. Tasks include:

- Managing the acquisition, storage, and allocation of the data collected by all sites as the **Study Data Manager**.
- 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, 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.
- Interacting with NHS patients to maximize the compliance of wearable sensor usage.

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

Associate Lecturers support students in the following ways:

- Delivering tuition and feedback to help with learning and assessment preparation.
- 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.

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.

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**
Delivering the 'Part 3: Health' lectures for the Nanoscale Engineering Course (18 students for 2022–2023, 20 students for 2023–2024, 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 (4 students in 2023, 8 students in 2024 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 (22 students for 2022/2023, 18 for 2023/2024 and 19 for 2024/2025). *Supervision* is the University of Cambridge name for small group tutorials.

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 (300+ students for Michaelmas 2023 and 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.

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. Key activities included conducting market research, crafting persuasive funding pitches, and producing video marketing content. Collaborated with a student team and a supervisor on a real-world project provided by an inventor team, combining hybrid and in-person sessions to deliver a research-driven analysis of emerging technologies.

Publications

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

1. Gatecliff, L.*, **Alban-Paccha, M.V.***, Kissovsky, S., and Malliaras, G.G. (2025). *OECT-based Sensor Platform for the Simultaneous Detection of Cortisol and Adrenaline from Interstitial Fluid*. In Preparation.
2. Gatecliff, L., **Alban-Paccha, M.V.**, and Malliaras, G.G. (2025). *Multi-Functional Electronic Interface with Mobile Integration*. In Preparation.
3. **Alban-Paccha, M.V.**, Teran-Perez, J., Gul, U., Shenker, N., Malliaras, G.G., and Woods, C.G. (2025). *Enhancing Clinical Research Outcomes with Wearable Sensors: Compliance, Accuracy, and Stakeholder Perspectives with Pilot Data from the ADVANTAGE Consortium.* In Preparation.
4. **Alban-Paccha, M.V.***, Gatecliff, L.*, Kissovsky, S., Ruiz-Mateos Serrano, R., Keene, S.T., Han, S., and Malliaras, G.G. (2024). *Multimodal Transistorized Wearable Electrochemical Sensor Platform for Ion and Enzyme Analysis*. npj Flexible Electronics. Invitation. Submitted.
5. **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.
6. **Alban-Paccha, M.V.**, Jacobson, G., Moon, H., Malliaras, G.G., and Yoo, S. (2024). *Wearable Cardiac Sensor Patch for Wireless Biopotential Measurement*. Scientific Reports. Invitation. Under Review.
7. 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. (2024). *Cleanroom-Free Toolkit for Integrating Submicron-Resolution Bioelectronics on Flexibles.* Small. Under Review.
8. Sills, V.A., Rennie, K.L., Watson, C.J., Alderton, W., Li, N., Mascolo, C., Martinez-Hernandez, V., Antoniou, A., **Alban-Paccha, M.V.**, Scott, S., Langford, J., Shreves, A.H., Fitzgerald, R., and Flewitt, A. (2024). *Can*

Cancer be Detected Earlier by Employing Wearable Technologies? Meeting report from the Early Cancer Institute and Precision Health Initiative, University of Cambridge, UK, 20th October 2023. Preprint. MedRxiv.

9. 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
10. **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
11. 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. **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.
2. **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.
3. **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
4. **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.

Pending

2025 Chronic Pain Grant (Alban-Paccha). Requested £50,000.00 for salary and research expenses from the Annabels Foundation from 06/2025 to 05/2026. Wrote proposal and held multiple meetings with stakeholders.

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

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 – 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.