

## Francisco Bernardo PhD • AFHEA • MA • MSc • ENG

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### EDUCATION AND QUALIFICATIONS

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2020	Ph.D. – Goldsmiths, University of London – Computer Science
2013	M.A. – Portuguese Catholic University – Management in the Creative Industries (Summa Cum Laude)
2009	M.Sc. – University of Minho – Mobile Systems
2006	Diploma – University of Minho – Computer Science and Systems Engineering (5-year ENG degree)

### SPECIALISM AND INTERESTS

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Human-centred Machine Learning; Frontend software design and engineering; Interaction Design; UX Research; API design; Toolkit design; Information Visualization; Interactive Audio Programming;

### EMPLOYMENT HISTORY

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#### ACADEMIC POSITIONS HELD

**January 2019 – Current**                      **University of Sussex, UK**  
**Postdoctoral Research Fellow at the Media, Film and Music School**  
**(EMUTE Lab) in the AHRC - funded project MIMIC ([AH/R002657/1](https://ahrc.ukri.org/projects/summary.asp?id=AH/R002657/1)).**

- Defined strategic research goals, designed the development infrastructure and stack.
- Co-created and developed a new EdTech prototype—Sema (<https://sema.codes>), a musical live coding playground and web-based IDE with high-performance workflows for machine learning, domain-specific language design and compilation, and real-time audio DSP.
- Led software architecture and frontend engineering using modern, high-performance Web technologies (Javascript, CSS, HTML, Svelte, Webpack, Web Audio API, WebAssembly, Emscripten, Tensorflow.js, Magenta.js).
- Designed the information architecture, UX and instructional content.
- Carried out user research (workshops, surveys, interviews, ethnography, usability testing, mixed methods data analysis and product research) and community-building interventions.
- Published in 2 conferences and 2 journals, including the Audio Engineering Society Journal and a Best Paper Award at the Web Audio Conference.
- Core contributor to the Maximilian DSP library (<https://bit.ly/35tu4LZ>) and the <https://MIMICproject.com> platform.
- Lectured the Interactive Music Systems module of the Music Technology degree.

**July 2019**

**University of Arts London, UK  
Creative Computing Institute (CCI) – Summer Course Instructor**

- Designed and delivered an intensive hands-on course—“Designing with Data and Interactive Machine Learning”—to teach machine learning with real-time sensor data to 25+ students in creative industries -oriented Masters degrees.
- Applied rapid prototyping and design sprints as constructivist and experiential learning techniques with user-friendly machine learning tools—Tensorflow.js and Wekinator and Rapid-Mix API (in-house developed technologies). Student satisfaction index: 8.5/10.

**Feb 2015 – Dec 2019**

**Goldsmiths, University of London, UK  
Research Assistant at the Computing Department (EAVI Lab)  
in the EU H2020 – funded project [RAPID-MIX](#) (EU H2020-ICT-2014-1,  
ID 644862)**

- Identified client research needs and defined strategic research goals for a multi-institutional, technology transfer and innovation consortium comprising three leading-edge European research centres and five high-profile music technology start-ups.
- Designed and applied a longitudinal action design research study with the consortium stakeholders.
- Designed a methodological toolkit for the consortium to apply user-centred design and led interventions with both stakeholders and end users (co-design workshops, large-scale hackathons, surveys, interviews, ethnography, design personas, prototyping, cognitive walkthroughs, discount usability and cognitive dimensions).
- Designed and developed a toolkit for interactive machine learning (<https://rapidmixapi.com/>) (Javascript, HTML, CSS, C++, emscripten, asm.js, Python).
- Carried out user research and usability assessment of prototypes and products with creative developers of music technology start-ups.
- Led systematic data collection, mixed methods data analysis, and the production of deliverables to the EU commission, reporting on research findings, processes, design principles and best practices.
- Published in 3 conferences and one journal.
- As a member of the Google ATAP Soli Alpha Developers program, produced experimental prototypes for millimetre radar signal data visualisation, interactive machine learning, mobile AR and musical interaction, which were selected for the Google ATAP showcase presentation at Google IO 2016.

**May 2013 – Dec 2015**

**Portuguese Catholic University, Portugal  
Research Assistant at Research Centre for Science and Technology of  
the Arts (CITAR) in project VisualYzArt (FEDER–COMPETE program  
POFC, ID 23201)**

- Produced the state-of-the-art and market research.
- Designed and developed experimental prototypes for augmented reality and 3D natural user interfaces with motion capture (Vicon, Kinect, LeapMotion).
- Lectured the Interactive Sound Design module of the Digital Design Post-Graduation.
- Designed and delivered workshops on Research Strategy and Methodology Design for two Master degrees.
- Published in 4 conferences and one journal, including a Best Paper award at the 2013 Music Business

Research Days, Vienna.

**May 2006 – May 2007**

**University of Minho, Portugal  
Research Assistant at ALGORITMI Research Centre (Ubicomp group)  
in project SituAction (POS-C/EIA/58832/2004)**

- Designed and developed a middleware architecture for context-aware applications which applied sensor fusion, computer vision, video and image processing, for situated interaction with public screen applications.
- Contributed to the successful transfer of research products into the core of a research spin-off and start-up (later acquired by a larger retail software company).

### **INDUSTRY POSITIONS HELD**

**Jan 2011 – April 2013**

**Primavera Business Software Solutions, Braga, Portugal  
Frontend Software Engineer for Business Intelligence products at the  
Innovation in Technologies division**

- Developed a modular software architecture and components for business analytics dashboards with OLAP and data warehousing connectors (Silverlight, C#.NET, SQL Server, Analysis Services, WCF).
- Designed and developed the UI architecture, UX and content for dashboards and BI indicators.
- Designed and developed a mobile application for ERP global sales indicators (iOS, Objective-C).

**May 2007 – May 2013**

**Ubisign, Corporate TV and Digital Signage, Braga, Portugal  
Senior software engineer, greenfield project manager**

- Designed, developed and maintained progressive Web applications, cloud-based software infrastructures, SaaS products, video applications and components.
- Designed and engineered complex user interface architectures and interaction for public screen, web, mobile and augmented reality applications.
- Designed, developed and maintained end-user WYSIWYG tools for network, channel, and content management of digital signage and corporate TV networks (a single page web application embedded in the SaaS infrastructure, and a standalone desktop application—Silverlight, WPF, XAML, C#.NET, PRISM framework and WCF services).
- Designed and developed a gestural-based interactive product catalogue for multimedia kiosks with audience video analytics for automatic and dynamic content segmentation (Kinect, WPF, C#.NET, Intel AIM, DirectShow).
- Developed video and hardware plugins for high-performance desktop multimedia systems (C#.NET, WPF and DirectShow, Windows Media Foundation, live video capture and processing with webcams, video capture cards and TV tuners; RFID readers, sensors, GSM network modems, QR code detection, and Bluetooth integration).

### **PEER-REVIEWED PUBLICATIONS**

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- Bernardo, F., Kiefer, C., Magnusson, T. (forthcoming). *A Signal Engine for a Live Code Language Ecosystem*. Journal of Audio Engineering Society. WAC Special Issue. Vol. 68 N.1.

- Bernardo, F., Zbyszyński, M., Grierson, M., Fiebrink, R. (2020) *Designing and Evaluating the Usability of a Machine Learning API for Rapid Prototyping Music Technology*. *Frontiers in Artificial Intelligence – Machine Learning and Artificial Intelligence*. Special issue on Music and AI. Vol. 3. DOI:10.3389/frai.2020.00013
- Bernardo, F. (2020). *Interactive Machine Learning for User-Innovation Toolkits: An Action Design Research approach*. Doctoral thesis. London: Goldsmiths, University of London.
- Bernardo, F., Kiefer, C., Magnusson, T. (2020). *Designing for a Pluralist and User-Friendly Live Code Language Ecosystem with Sema*. 5th International Conference on Live Coding, University of Limerick, Limerick, Ireland
- Bernardo, F., Kiefer, C., Magnusson, T. (2019). *An AudioWorklet-based Signal Engine for a Live Coding Language Ecosystem*. In *Proceedings of Web Audio Conference 2019*, Norwegian University of Science and Technology (NTNU), Trondheim, Norway (Best Paper Award at Web Audio Conference 2019)
- Bernardo, F., Grierson, M., Fiebrink, R. (2018). *User-Centred Design Actions for Lightweight Evaluation of an Interactive Machine Learning Toolkit*. *Journal of Science and Technology of the Arts (CITARj)*, v. 10, n. 2, p. 2- 25-38, jul. 2018. ISSN 2183-0088. DOI: <http://dx.doi.org/10.7559/citarj.v10i2.509>
- Bernardo, F., Zbyszyński, M., Fiebrink, R., Grierson, M. (2017). *Interactive Machine Learning for End-User Innovation*. *Designing the User Experience of Machine Learning Systems*. In *Proceedings of Association for the Advancement of Artificial Intelligence (AAAI) Spring Symposium*, Stanford University, Palo Alto, CA
- Bernardo, F., Arner, N., Batchelor, P. (2017). *O Soli Mio: Exploring Millimeter Wave Radar for Musical Interaction*. *Proceedings of New Interfaces for Musical Expression 2017*, Aalborg University, Copenhagen, Denmark
- Parkinson, A., Zbyszyński, M., Bernardo, F. (2017). *Demonstrating Interactive Machine Learning Tools for Rapid Prototyping of Gestural Instruments in the Browser*. *Proceedings of Web Audio Conference 2017*, Queen Mary University of London, London, UK.
- Bernardo, F., Pestana, P., Martins, L. (2015). *The Smart Stage: Designing 3D Interaction Metaphors for Immersive and Ubiquitous Music Systems*. *International Conference on New Music Concepts (ICNMC 2015)*, Treviso, Italy - ISBN: 978-88-6551-188-6
- Bernardo, F., Martins, L. (2014). *Disintermediation Effects on Independent Approaches to Music Business*. *International Journal of Music Business Research (IJMBR)* – issn 2227-5789
- Bernardo, F. (2014). *Music video games in live performance: Catachresis or an emergent approach?* *Videojogos 2014 - Conferência de Ciências e Artes dos Videojogos*, Barcelos, Portugal
- Bernardo, F. (2014). *Dodging the Middleman: Insights on Disintermediation in the Independent Music Sector*. *KISMIF International Conference on Underground music scenes and DIY cultures*, Porto, Portugal
- Bernardo, F., Martins, L. (2013). *Disintermediation effects in the music business – A return to old times?* *Music Business Research Days 2013*, Vienna, Austria. (Best Paper Award at the Young Scholars Workshop at Music Business Research Days 2013, Vienna, Austria).
- José, R., Bernardo, F. (2009). *Extended Bluetooth naming for empowered presence and situated*

## TEACHING AND WORKSHOP FACILITATION EXPERIENCE

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- 2019 Interactive Music Systems – 2nd-year module of the Music Technology undergraduate degree, School of Media, Film and Music, University of Sussex, Brighton, United Kingdom
- 2019 Designing with Data and Interactive Machine Learning – (5-day intensive course) at the Creative Computing Institute, University of the Arts, London, United Kingdom
- 2019 Designing and Performing with Live Coding Languages for Signal Processing and Machine Intelligence on the Web – (workshop) organiser and facilitator at Web Audio Conference 2019, Norwegian University of Science and Technology (NTNU), Trondheim, Norway
- 2019 MIMIC Artist Summer Workshop – Workshop organiser and facilitator, Sussex Humanities Lab – School of Media, Sound and Music, University of Sussex, Brighton, UK
- 2019 Live Coding Machine Learning – (workshop) 4th International Conference on Live Coding, MediaLab Prado, Madrid
- 2018 Designing with Data and Interactive Machine Learning – (invited lecture) – Masters in Product Design, Royal College of Art, London, United Kingdom
- 2017 *The RAPID-MIX API: a toolkit for fostering innovation in the creative industries with Multimodal, Interactive and eXpressive (MIX) technologies* – (2-week long summer workshop) main organiser and leader. eINTERFACE'17 – 13th International Summer Workshop on Multimodal Interfaces, 3 – 28 July, Porto, Portugal.
- 2017 Sound Design in the Cloud – Workshop facilitator with Visda Goudarzi, Mathieu Barthet, Miguel Ceriani, Johan Pauwels, György Fazekas and Rebecca Fiebrink. AudioMostly 2017: Augmented and Participatory Sound and Music Experiences, 23-26 August. Queen Mary University of London, UK
- 2016 SoliDSPFeatures2OSC: Feature Selection Tool for Prototyping Creative Audiovisuals with Soli – Presenter - Soli Alpha Developers Workshop, Google, Mountain View, California
- 2016 Interactive Applications in Machine Learning – Workshop co-presenter with Atau Tanaka Porto International Conference on Musical Gesture as Creative Interface, Porto, Portugal
- 2015 Design de Tecnologias Wearable para Performance Expressiva e Musical – (workshop) facilitator with Michael Zbyszyński. MakerFaire Lisbon 2015, Lisbon, Portugal
- 2014 Research Strategy and Methodology Design – (invited lecture) Masters in Management for the Creative Industries, Portuguese Catholic University, Porto, Portugal
- 2014 Interactive Sound Design and Dataflow Programming with PureData – (module) in the post-graduation degree in Digital Design, Portuguese Catholic University, Porto, Portugal
- 2014 Research Strategy and Methodology Design – (invited lecture) Masters in Music Teaching Portuguese Catholic University, Porto, Portugal
- 2013 Research Strategy and Methodology design – (invited lecture) – Science and Technology of the Arts Doctoral Programme, Portuguese Catholic University, Porto, Portugal

## CONFERENCE REVIEWING

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2019	International Conference on Live Interfaces (ICLI)
2018–2019	ACM Human Factors in Computing Systems (CHI)
2016	International Conference on Tangible, Embedded and Embodied Interaction (TEI)

## SELECTED PUBLIC TALKS

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2020	AAAS, Seattle, UKRI Live Arena “AI in the Creative Industries”
2020	AI+JS Meetup London, “Making Music and Art with Machine Intelligence”
2018	ETSIDI-UPM, Madrid, “Fostering synergies between Art and Innovation” – <i>El Arte como Herramienta de Innovación y Emprendimiento</i>
2014	The Smart Stage: Designing interaction for immersive and ubiquitous music systems – Encontro Nacional de Investigação em Música (ENIM), Lisbon, Portugal
2013	Disintermediation effects in the music business – Vienna Music Business Research Days

## ORGANISATION

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2020	Sema: Live Coding with Machine Learning
2019	MIMIC Artist Summer Workshop
2017	eINTERFACE’17 – 13th International Summer Workshop – The RAPID-MIX API: a toolkit for fostering innovation in the creative industries with Multimodal, Interactive and eXpressive (MIX) technologies.
2006	CMUS – Conference on Mobile and Ubiquitous Systems.

## AWARDS AND HONOURS

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2019	Best Paper award at Web Audio Conference, Trondheim, Norway
2017	Spotify Award at the Anvil Hack III, Goldsmiths’ Hacksmiths Tech society
2016	‘Best-in-Show’ award for ‘LovePad’, at the Sex Tech Hackathon
2016	Google ATAP Soli Alpha Developer prototypes featured at Google I/O
2015–2019	PhD Scholarship funded by the EU H2020 RAPID-MIX
2013	Best Paper award at Vienna Music Business Research Days, Vienna, Austria
2009	The People’s Music Award in the Off-the-Beaten Music Category, London
2013	Research grant awarded by <i>Fundação da Ciência e Tecnologia</i> (FCT)
2006–2007	Two research grants awarded by <i>Fundação da Ciência e Tecnologia</i> (FCT)

## OTHER EDUCATION AND CERTIFICATIONS

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2020	Associate Fellow of the Higher Education Academy, Level 7 on FHEQ UK, 15 credits
2019	GDPR – University of Sussex
2016	Designing, Running and Analysing Experiments – University of California San Diego
2016	Information Design – University of California San Diego
2016	User Experience: Research & Prototyping – University of California San Diego

2016	Social Computing – University of California San Diego
2015	Input and Interaction – University of California San Diego
2015	Design Principles: An Introduction – University of California San Diego
2015	Human-Centred Design: An Introduction – University of California San Diego
2014	Critical Thinking: Processes and tools – Catholic University of Portugal
2013	Introduction to Digital Sound Design – Emory University
2012	Certificate of Proficiency in English – Cambridge ESOL
2011	Microsoft Certified Professional in .NET Application Development Foundation
2005	Leadership Course – Portuguese Military Academy
1997	Certificate in Advanced English – Cambridge ESOL
1995	First Certificate in English – Cambridge ESOL

## **OTHER SKILLS & TECHNOLOGIES:**

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- Front-end architecture and development of desktop, web and AR applications.
- Mobile development in iOS, WP7, Windows Mobile 6.5, J2ME, Bluetooth protocol and development.
- Agile, extreme programming, SCRUM methodologies, design patterns and test-driven development.
- Programming Languages: C#, C/C++, Obj-C, Javascript, HTML, CSS, Java, Haskell, SQL, Python.
- Development frameworks: Svelte, React, Webpack, WPF, Silverlight, DirectShow, PRISM, Tensorflow.js, Fiddler, Graphedit, SourceSafe, Openframeworks, OpenCV.
- Development environments: VSCode, Visual Studio, Expression Suite, XCode, Team Foundation Server, PureData, Unity3D, NUnit, FxCop, CruiseControl, Git, Travis, CI/CD.
- Backend: RIA Services, WCF, ADO.NET, MS SQL Server, MS Analysis Server, Apache Web Server, AWS, RIA, MySQL, MongoDB.
- Modelling and UI Prototyping: OmniGraffle, Balsamic Mockups.
- Other: NVivo, RStudio, LaTeX, Mendeley, MS Office Suite, Project and Visio, Adobe Premier, After Effects

## **STRENGTHS**

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- Innovation-driven, strategic thinker and highly creative maker. Very organized and methodical.
- Good team player with strong initiative and ability to take on leadership positions.
- Excellent reading, writing and communication skills with ability for public speaking.
- Preference for collaboration in multi-faceted projects and multicultural environments.

## **ADDITIONAL INFO**

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Languages: Portuguese (Native), English (Proficient), Spanish (intermediate), French (basic)  
 Portuguese Citizen, Canadian Citizen, UK Pre-Settled status.

Multi-instrumentalist experienced in guitar, piano, electronics and interactive audiovisuals.