

# João Carreira

## *Curriculum vitae*

### SUMMARY

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Electrical Engineer, PhD, specialist in video coding, transmission and quality evaluation with experience with both immersive 3D audio and video.

Versatile and very enthusiastic about software development and problem-solving, always seeking new challenges. I am always looking for new topics to learn which help me solve day to day problems and automate and ease my workflow.

Main interests include audio and video processing, software development, embedded systems and operating systems and more recently home automation and IoT devices.

### WORK EXPERIENCE

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#### June 2021 – Present

Sound Particles

#### *Audio Software development*

Software developer behind the Sound Particles software with contributions focusing software architecture and audio signal processing.

Lead developer of audio plug-ins (VST/AU/AAX) using JUCE framework.

Mainly working on modern C++ (latest C++ standards).

#### March 2019 – May 2021

Instituto de Telecomunicações - IT

#### *Research assistant*

ARoundVision project: investigate new coding and processing tools for UHD-360° video, aiming at developing new scalable and low complexity encoders.

Responsibilities include work with the research leader in the management of the activities of the different researchers.

#### March 2017 – Present

ESTG, Polytechnic Institute of Leiria

#### *Invited Assistant Lecturer*

Professor of Electronics Engineering Department.

Contents: circuits analysis, analogue and digital signal processing, embedded programming, C/C++ language.

#### November 2008 – February 2019

Instituto de Telecomunicações - IT

#### *Research fellow*

2013-2018: Develop techniques to improve the error resilience and error concealment of the HEVC standard.

2009-2012: P3DTV Project - Development of error concealment techniques and subjective quality evaluation of 3D video quality affected by transmission errors in video decoder's complaint with H.264/MVC.

2008-2009: Research on the state-of-the-art technologies for digital television broadcast; performance evaluation of DVB-T transmission using R&S SFE and R&S DVM400.

#### January 2014 – March 2014

University of Surrey

#### *Assistant Lecturer*

Lecturer on practical based course work of software and hardware development.

Contents: C language, microcontrollers programming.

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### EDUCATION

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#### January 2015 – December 2018

IDT, Loughborough University London

#### *PhD in Electrical Engineering*

*Thesis title:* Error resilience and error concealment for High Efficiency Video Coding

*Supervisors:* Ahmet Kondoç, Erhan Ekmekcioglu - IDT; Pedro Assunção, Sérgio Faria - IT.

#### April 2013 – December 2014

University of Surrey

#### *PhD Student in Electrical Engineering*

*Supervisors:* Ahmet Kondoç, Erhan Ekmekcioglu; Pedro Assunção, Sérgio Faria.

#### September 2010 - December 2012

ESTG, Polytechnic Institute of Leiria

#### *MSc in Electrical Engineering - Telecommunications*

*Thesis title:* "Subjective Quality Evaluation and Frame Loss Concealment in 3D Video".

*Supervisors:* Pedro Assunção, Sérgio Faria and Nuno Rodrigues.

*Classification:* 18 out of 20.

#### September 2007 - July 2010

ESTG, Polytechnic Institute of Leiria

#### *BSc in Electrical Engineering – Electronics and Telecommunications*

*Final project title:* "DVB-T3D - Transmission of 3D Television over a DVB-T Channel".

*Supervisors:* Pedro Assunção and Sérgio Faria.

*Classification:* 17 out of 20.

### TECHNICAL SKILLS

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- Research and development;
- 2D/3D and 360° image and video analysis and compression;
- 3D audio rendering and processing;
- Familiar with Open Source tools for audio, image and video processing, e.g., JUCE, FFMpeg, OpenCV, FFMpeg;
- Experience with programmable devices, e.g., Microcontrollers, ESP, Arduino and FPGA;
- Advanced experience with Linux operating system;
- Experience with software configuration management (SCM), e.g., Git.

## SOFTWARE SKILLS

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IDE	VSCode, Xcode, Eclipse, MPLAB;
TOOLS	Shell tools (sed, awk, grep), gcc, clang, CMake, valgrind, doxygen, catch2, gtest, CI/CD; GitHub
CONTAINERS	Docker, LXC
OS	Gentoo, Debian/Ubuntu, MacOS, Windows;
CODECS	VVC, HEVC and H.264/AVC;
OPEN SOURCE	JUCE, OpenCV, FFmpeg, KDE/Qt;
WORKFLOW	JIRA, Confluence, MS Word and Excel;

## PROGRAMMING SKILLS

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ADVANCED	C, C++ 20, shell scripting, $\LaTeX$ .
INTERMEDIATE	Python, Matlab
BEGINNER	Jinja2, HTML, VHDL, Ladder.

## COMMUNICATION SKILLS

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PORTUGUESE	Native speaker
ENGLISH	Oral: fair – Written: good
IELTS - International English Language Testing System: Average score of 7.0 out of 10 (2013).	

## ADDITIONAL INTERESTS

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- **Open Source software development:** main developer of the open source raw video player *Calyp* based on Qt with support for plugins (<https://github.com/pixlra/calyp>); Contributor on other projects on GitHub (e.g., KTikZ) and minor contributions to Gentoo OS and KDE framework;
- **Self-hosting:** home automation software (Home Assistant), communication protocols (MQTT, Zigbee) and software/hardware management (Nextcloud, reverse proxy and firewall management);
- **Embedded and IoT devices:** Raspberry PI, Arduino, ESP and Microchip;
- Helping on local non-profit organisation.

## MAIN PUBLICATIONS

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### JOURNAL PUBLICATIONS:

- J. F. M. Carreira, P. A. Assunção, S. M. M. de Faria, E. Ekmekcioglu, and A. Kondoç, "Error concealment-aware encoding for robust video transmission," *IEEE Transactions on Broadcasting*, vol. 65, no. 2, pp. 282–293, Jun. 2019
- J. Carreira, P. Assuncao, S. Faria, E. Ekmekcioglu, and A. Kondoç, "A Two-stage Approach for Robust HEVC Coding and Streaming," *IEEE Transactions on Circuits and Systems for Video Technology*, vol. 28, no. 8, pp. 1960–1973, Aug. 2018.

### INTERNATIONAL CONFERENCE PUBLICATIONS:

- J. Carreira, S. M. M. de Faria, L. M. N. Tavora, A. Navarro, and P. A. Assuncao, "Attention-driven tile splitting method for improved efficiency of omnidirectional versatile video coding," in *2021 IEEE International Conference on Image Processing (ICIP)*, Sep. 2021, pp. 2149–2153.
- J. Carreira, S. M. M. de Faria, L. M. N. Tavora, A. Navarro, and P. A. Assuncao, "Versatile video coding of 360° video using adaptive resolution change," in *2020 IEEE International Conference on Image Processing (ICIP)*, Oct. 2020, pp. 3398–3402.
- J. Carreira, S. M. M. de Faria, L. M. N. Tavora, A. Navarro, and P. A. Assuncao, "Scalable coding of 360-degree video for streaming adaptation at 5G network edges," in *IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB)*, Oct. 2020, pp. 1–5.
- J. Carreira, S. M. M. de Faria, L. M. N. Tavora, A. Navarro, and P. A. Assuncao, "Versatile video coding of 360-degree video using frame-based FoV and visual attention," in *IEEE International Symposium on Multimedia (ISM)*, Dec. 2019, pp. 80–805.
- J. Carreira, P. Assuncao, S. Faria, E. Ekmekcioglu, and A. Kondoç, "A Robust Video Encoding Scheme to Enhance Error Concealment of Intra Frames," in *IEEE International Conference on Circuits and Systems (ISCAS)*, May 2017, pp. 1–5.
- J. Carreira, E. Ekmekcioglu, A. Kondoç, P. Assuncao, S. Faria, and V. D. Silva, "Selective Motion Vector Redundancies for Improved Error Resilience in HEVC," in *IEEE International Conference on Image Processing (ICIP)*, Oct. 2014, pp. 2457–2461.
- J. Carreira, P. Assuncao, N. Rodrigues, and S. Faria, "Frame Loss Concealment for 3D Video Decoders Based on Disparity-Compensated Motion Field," in *3DTV-Conference: The True Vision - Capture, Transmission and Display of 3D Video (3DTV-CON)*, Oct. 2012, pp. 1–4.
- J. Carreira, L. Pinto, N. Rodrigues, S. Faria, and P. Assuncao, "Subjective Assessment of Frame Loss Concealment Methods in 3D Video," in *Picture Coding Symposium (PCS)*, Dec. 2010, pp. 182–185.

For a complete list of my publications please visit <https://jcarreira.pt/publications>