



JOÃO RIBEIRO PINTO

C U R R I C U L U M V I T Æ

Researcher in Pattern Recognition

Born: January 26th, 1994, in Vila Real, Portugal

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***About me:** I hold an integrated master degree in Bioengineering - Biomedical Engineering, and I am currently pursuing a Ph.D. degree in Electrical and Computers Engineering. I have studied a wide array of subjects such as sensors, electronics, signal processing, image analysis, programming, biomechanics, robotics, bionics, and entrepreneurship. Currently, as Research Assistant at the Visual Computing and Machine Learning research group of INESC TEC, I work on signal processing, computer vision, and pattern recognition for continuous biometric recognition and well-being monitoring. I am especially focused mainly on advancing the use of ECG signals from off-the-person, unconstrained, and seamless acquisition settings for simultaneous identity and wellbeing recognition. Besides pattern recognition, I am very passionate about graphic design, web development, history, geography, vexillology, heraldry, and politics.*

Current positions

since 10/2018

Ph.D. Student, Faculdade de Engenharia da Universidade do Porto (FEUP)

since 10/2017

Research Assistant, Centre for Telecommunications and Multimedia – INESC TEC

Education

since 2018

Doctoral Programme in Electrical and Computers Engineering

Faculdade de Engenharia da Universidade do Porto

Thesis: *Seamless Multimodal Biometrics for Continuous Personalised Wellbeing Monitoring*

Supervisors: Prof. Dr. Jaime S. Cardoso (INESC TEC) & Prof. Dr. Miguel V. Correia (INESC TEC)

2014–2017

Integrated Master in Bioengineering – Biomedical Engineering

Faculdade de Engenharia da Universidade do Porto, Portugal

Integrated Bachelor & Master degree (grade 16 out of 20)

Dissertation: *Continuous Biometric Identification on the Steering Wheel*

Supervisors: Prof. Dr. Jaime S. Cardoso (FEUP) & Prof. Dr. André Lourenço (CardioID Technologies)

Research activity

- since 10/2018 **Ph.D. Scholarship** for research on pattern recognition for multimodal biometrics and well-being monitoring
Fundação para a Ciência e Tecnologia, IP (FCT), Portugal
- 01-09/2018 **M.Sc. Scholarship** on image analysis for archive documents and media content (CHIC project)
Faculdade de Engenharia da Universidade do Porto, Portugal
- 08-12/2017 **M.Sc. Scholarship** on deep learning for electrocardiogram biometric identification
Faculdade de Engenharia da Universidade do Porto, Portugal
- 2016-2017 **M.Sc. Thesis Student and Intern** on off-the-person continuous ECG biometrics
CardioID Technologies Lda., Portugal

Participation in Research Projects

- since 02/2020 **Collaborator** at *Easy Ride Project*: In-vehicle activity recognition and wellbeing measurement.
- since 07/2019 **Collaborator** at *AUTOMOTIVE Project*: Driver drowsiness monitoring using unconstrained video and physiological signals.
- 01-09/2018 **Scholarship Researcher** at *CHIC Project*: Quality assessment of print text documents for optical character and image recognition.

Current areas of expertise and research interests

Biometrics: seamless/unconstrained/off-the-person biometrics, physiological traits, interpretability

Well-being monitoring: wearables, seamless acquisition, continuous monitoring, quantified self

Pattern recognition: computer-aided diagnosis, signal processing, image analysis, machine & deep learning

Scientific publications

JOURNAL ARTICLES (5 PUBLICATIONS)

- 2021 J. R. Pinto, M. V. Correia, and J. S. Cardoso, "Secure Triplet Loss: Achieving Cancelability and Non-Linkability in End-to-End Deep Biometrics," *IEEE Transactions on Biometrics, Behavior, and Identity Science*. doi:10.1109/TBIOM.2020.3046620 (in press)
- 2020 S. P. Oliveira, J. R. Pinto, T. Gonçalves, R. C. Marques, M. J. Cardoso, H. P. Oliveira, and J. S. Cardoso, "Weakly-Supervised Classification of HER2 Expression in Breast Cancer Haematoxylin and Eosin Stained Slides," *Applied Sciences* 10 (14): 4728. doi:10.3390/app10144728
- 2018 J. R. Pinto, J. S. Cardoso, and A. Lourenço, "Evolution, Current Challenges, and Future Possibilities in ECG Biometrics," *IEEE Access* 6: 34746-34776. doi:10.1109/ACCESS.2018.2849870
- 2017 J. R. Pinto, J. S. Cardoso, A. Lourenço, and C. Carreiras, "Towards a Continuous Biometric System Based on ECG Signals Acquired on the Steering Wheel," *Sensors* 17 (10): 2228. doi:10.3390/s17102228
- 2017 J. R. Pinto and J. M. R. S. Tavares, "A versatile method for bladder segmentation in computed tomography two-dimensional images under adverse conditions," *Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine* 231 (9): 871-880. doi:10.1177/0954411917714294

INTERNATIONAL CONFERENCE ARTICLES (9 PUBLICATIONS)

- 2021 A. Matta, J. R. Pinto, and J. S. Cardoso, "Mixture-Based Open World Face Recognition," in *9th World Conference on Information Systems and Technologies (WorldCIST'21)*, 30 March - 2 April, Terceira Island, Azores, Portugal. (accepted)
- 2020 J. R. Pinto, T. Gonçalves, C. Pinto, L. Sanhudo, J. Fonseca, F. Gonçalves, P. Carvalho, and J. S. Cardoso, "Audiovisual Classification of Group Emotion Valence Using Activity Recognition Networks," in *Fourth IEEE International Conference on Image Processing, Applications and Systems (IPAS 2020)*, 9-11 December, Genoa, Italy. doi:10.1109/IPAS50080.2020.9334943
- 2020 J. R. Pinto and J. S. Cardoso, "Explaining ECG Biometrics: Is It All In The QRS?," in *International Conference of the Biometrics Special Interest Group (BIOSIG 2020)*, 16-18 September, Darmstadt, Germany. Available online at: <https://dl.gi.de/20.500.12116/34321>
- 2020 J. R. Pinto and J. S. Cardoso, "Self-Learning with Stochastic Triplet Loss," in *International Joint Conference on Neural Networks (IJCNN 2020)*, 19-24 July, Glasgow, United Kingdom. doi:10.1109/IJCNN48605.2020.9206799
- 2020 J. R. Pinto, J. S. Cardoso, and M. V. Correia, "Secure Triplet Loss for End-to-End Deep Biometrics,"

in *8th International Workshop on Biometrics and Forensics (IWBF 2020)*, 29–30 April, Porto, Portugal. doi:10.1109/IWBF49977.2020.9107958

2020 A. F. Sequeira, W. Silva, J. R. Pinto, T. Gonçalves, and J. S. Cardoso, “Interpretable Biometrics: Should We Rethink How Presentation Attack Detection is Evaluated?,” in *8th International Workshop on Biometrics and Forensics (IWBF 2020)*, 29–30 April, Porto, Portugal. doi:10.1109/IWBF49977.2020.9107949

2019 J. R. Pinto and J. S. Cardoso, “An End-to-End Convolutional Neural Network for ECG-Based Biometric Authentication,” in *10th IEEE International Conference on Biometrics: Theory, Applications and Systems (BTAS 2019)*, 23–26 September, Tampa FL, United States. doi:10.1109/BTAS46853.2019.9185990

2019 G. Lopes, J. R. Pinto, and J. S. Cardoso, “Don’t You Forget About Me: A Study on Long-Term Performance in ECG Biometrics,” in *IbPRIA 2019: 9th Iberian Conference on Pattern Recognition and Image Analysis*, 1–4 July, Madrid, Spain. doi:10.1007/978-3-030-31321-0_4

2018 W. Silva, J. R. Pinto, and J. S. Cardoso, “A Uniform Performance Index for Ordinal Classification with Imbalanced Classes,” in *International Joint Conference on Neural Networks (IJCNN 2018)*, 8–13 July, Rio de Janeiro, Brazil. doi:10.1109/IJCNN.2018.8489327

BOOK CHAPTERS (2 PUBLICATIONS)

2021 J. R. Pinto and J. S. Cardoso, “ECG Biometrics,” in S. Jajodia, P. Samarati, and M. Yung, Eds., *Encyclopedia of Cryptography, Security and Privacy*, Springer, ISBN:978-3-642-27739-9, doi:10.1007/978-3-642-27739-9_1517-1

2019 J. R. Pinto, J. S. Cardoso, and A. Lourenço, “Deep Neural Networks for Biometric Identification Based on Non-Intrusive ECG Acquisitions,” in K. V. Arya and R. S. Bhadoria, Eds., *The Biometric Computing: Recognition and Registration*, Boca Raton FL, United States: CRC Press, ISBN:978-0-8153-9364-1, doi:10.1201/9781351013437-11

NATIONAL CONFERENCE ARTICLES (7 PUBLICATIONS)

2020 J. R. Pinto, M. V. Correia, and J. S. Cardoso, “Achieving Cancellability in End-to-End Deep Biometrics with the Secure Triplet Loss,” in *26th Portuguese Conference on Pattern Recognition (RECPAD 2020)*, 30 October, Évora, Portugal.

2020 S. P. Oliveira, J. R. Pinto, T. Gonçalves, H. P. Oliveira, and Jaime S. Cardoso, “IHC Classification in Breast Cancer H&E Slides with a Weakly-Supervised Approach,” in *26th Portuguese Conference on Pattern Recognition (RECPAD 2020)*, 30 October, Évora, Portugal.

2020 W. Silva, J. R. Pinto, T. Gonçalves, A. F. Sequeira, and Jaime S. Cardoso, “Explainable Artificial Intelligence for Face Presentation Attack Detection,” in *26th Portuguese Conference on Pattern Recognition (RECPAD 2020)*, 30 October, Évora, Portugal.

2019 J. R. Pinto and J. S. Cardoso, “Fine Segmentation of Head and Torso Using Label Refinement Networks,” in *25th Portuguese Conference on Pattern Recognition (RECPAD 2019)*, 31 October, Porto, Portugal.

2019 G. Lopes, J. R. Pinto, J. S. Cardoso, and A. Rebelo, “Long-Term Performance of a Convolutional Neural Network for ECG-Based Biometrics,” in *25th Portuguese Conference on Pattern Recognition (RECPAD 2019)*, 31 October, Porto, Portugal.

2019 P. Costa, P. Silva, J. R. Pinto, A. F. Sequeira, and A. Rebelo, “Face Anti Spoofing: Handcrafted and Learned Features for Face Liveness Detection,” in *25th Portuguese Conference on Pattern Recognition (RECPAD 2019)*, 31 October, Porto, Portugal.

2018 J. R. Pinto, J. S. Cardoso, and A. Lourenço, “Improving ECG-Based Biometric Identification Using End-to-End Convolutional Networks,” in *24th Portuguese Conference on Pattern Recognition (RECPAD 2018)*, 26 October, Coimbra, Portugal.

THESES (1 PUBLICATION)

2017 J. R. Pinto, “Continuous Biometric Identification on the Steering Wheel,” Master in Bioengineering - Biomedical Engineering, Universidade do Porto.

CITATION RECORD

150 citations

h-index 4

i10-index 2

(according to Google Scholar, 14/02/2021)

Awards

2020 Best Session Paper Award at *IEEE IPAS 2020*;

2020 Computers Journal Best Paper Award at *IWBF 2020*;

2012 Best Essay Award (first prize) at *Prémio Católica 2012: Ciência e Saúde* on health, society, and gerontology.

Student supervision

MASTER'S DISSERTATIONS (8 STUDENTS)

- 2021 **Co-supervisor** of Sofia C. Beco, *Make My Heartbeat: Generation and Interlead Conversion of ECG Signals*, Master in Bioengineering, Universidade do Porto (2020/2021)
- 2021 **Co-supervisor** of Inês A. T. A. Magalhães, *Feel My Heart: Emotion Recognition Using the Electrocardiogram*, Master in Bioengineering, Universidade do Porto (2020/2021)
- 2021 **Co-supervisor** of Telma Esteves, *Sleepy Drivers: Drowsiness Monitoring Using ECG and Face Video*, Master in Biomedical Engineering, Universidade Nova de Lisboa (2020/2021)
- 2020 **Co-supervisor** of Arthur J. Matta, *Open-World Face Recognition*, Master in Informatics and Computing Engineering, Universidade do Porto (2019/2020)
- 2020 **Co-supervisor** of Leonardo G. Capozzi, *Face Recognition For Forensic Applications: Methods for Matching Facial Sketches to Mugshot Pictures*, Master in Informatics and Computing Engineering, Universidade do Porto (2019/2020)
- 2020 **Co-supervisor** of João M. G. Ferreira, *Head Pose Estimation for Facial Biometric Recognition Systems*, Master in Informatics and Computing Engineering, Universidade do Porto (2019/2020)
- 2020 **Co-supervisor** of Carolina M. B. R. Afonso, *Changing Perspectives: Interlead Conversion in Electrocardiographic Signals*, Master in Network and Information Systems Engineering, Universidade do Porto (2019/2020)
- 2019 **Co-supervisor** of Gabriel C. Lopes, *Don't You Forget About Me: Enhancing Long Term Performance in Electrocardiogram Biometrics*, Master in Bioengineering, Universidade do Porto (2018/2019)

INTERNSHIPS (12 STUDENTS)

- 2020 **Co-supervisor** of Susana Lima, *CTM Summer Internships 2020*, at INESC TEC, Porto, Portugal (07/2019)
- 2020 **Co-supervisor** of João Fonseca, *NEB Outclass Internship: Face Photograph Analytics*, at INESC TEC, Porto, Portugal (03/2020–06/2020)
- 2020 **Co-supervisor** of Catarina Lopes, *Face photograph analytics for automatic assessment of ICAO guideline compliance*, at INESC TEC, Porto, Portugal (2019/2020)
- 2019 **Co-supervisor** of Pedro Silva, Paulo Costa, Manuel Curral, Gil Teixeira, Pedro Neto, Martim Silva, João Mendes, João Moura, and Carolina Afonso, *CTM Summer Internships 2019*, at INESC TEC, Porto, Portugal (03/07/2019 – 02/08/2019)

Scientific events

- 2021 **Organisation Team Member** for *VISUM 2021* summer school, Porto, Portugal
- 2021 **Organisation Team Member** for *OpenDay CTM 2021* event, Porto, Portugal
- 2021 **Publicity & Local Organisation Chair** for *xAI4Biometrics* workshop at WACV 2021, Waikoloa, United States
- 2020 **Project Committee Member** for *VISUM 2020* summer school, Porto, Portugal
- 2020 **Demo Chair** for *IWBF 2020* conference, Porto, Portugal
- 2019 **Programme Committee Member** for *MEDICON 2019* conference, Coimbra, Portugal
- 2019 **Special Session Co-Organiser** for *CIBB 2019* conference, Bergamo, Italy
- 2019 **Project Committee Member** at *VISUM 2019* summer school, Porto, Portugal
- 2019 **Workshop Co-organiser** at CTM Open Day 2019
- 2017 **Communication and Image Team Member** at *8th Symposium in Bioengineering*, Porto, Portugal

Peer review

JOURNALS

- **IEEE**: *IEEE Transactions in Information Forensics and Security (TIFS)*, *IEEE Transactions on Artificial Intelligence (TAI)*, *IEEE Access*, *IEEE Sensors Letters*;
- **Springer Nature**: *Progress in Artificial Intelligence (PAI)*, *BMC Medical Informatics and Decision Making*, *Medical & Biological Engineering & Computing (MBEC)*;
- **IET**: *IET Biometrics*;
- **Elsevier**: *Biocybernetics and Biomedical Engineering (BBE)*;
- **MDPI**: *Sensors*, *Applied Sciences*, *Electronics*, *Symmetry*, *Algorithms*, *IJERPH*;
- **Sage**: *Journal of Engineering in Medicine (JOEIM)*.

CONFERENCES

- *IWBF 2021* conference;
- *xAI4Biometrics* workshop at WACV 2021;
- *ACM Multimedia 2020* conference;
- *IWBF 2020* conference;
- *CIBB 2019* conference;
- *MEDICON 2019* conference;
- *IEEE ENBENG 2019* conference;
- *IEEE BIOCAS 2018* conference;
- *CIBB 2018* conference.

Total of 58 reviews verified at Publons, 14 of which rated as excellent by the assigned editors

Professional societies

- since 2015 Graduate Student Member at IEEE (Institute of Electrical and Electronics Engineers)
- since 2017 Student Member at **Ordem dos Engenheiros** (official portuguese engineering society)
- since 2020 Student Member at EURASIP (European Association for Signal Processing)

Other voluntary and extracurricular activities

- 2016–2017 **Communication and Image Collaborator** at NEB-FEUP/ICBAS (Bioengineering students association)
- 2015–2017 **Vice-Chair** at EMBS UP (IEEE Engineering in Medicine and Biology student chapter)
- 2015–2017 **Member** at NuIEEE (IEEE student branch at Universidade do Porto)
- 2015–2016 **Student Researcher** at VILab (informal computer vision research group for students)
- 2014–2015 **Marketing Team Member** at BEST Porto (european engineering student group)

Programming & other knowledge

MOST USED

Python: numpy, scipy, scikit-learn, scikit-image, pandas, keras, pytorch
Matlab: including signal processing, image analysis, and machine learning tools
Web development: HTML5, CSS3, PHP, SQL, Javascript
Documents: Microsoft Office, LaTeX
Design: Adobe Illustrator

BASIC KNOWLEDGE

C/C++: object-oriented programming
Java: including Android mobile application development
LabVIEW: signal acquisition, processing, and control
OS: Linux, Windows

BRIEFLY USED

R: for bioinformatics programming
Web development: jQuery, ReactJS, AngularJS, Sass, C#, .NET

Language proficiency

Portuguese – Native language
English – Full professional proficiency