JOÃO RIBEIRO PINTO

C U R R I C U L U M   V I T Æ

Researcher in Pattern Recognition

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About me: I am currently a research assistant with the Visual Computing & Machine Intelligence (VCMI) research group at CTM, INESC TEC, and Ph.D. student in Electrical and Computers Engineering at Faculdadede Engenharia da Universidade do Porto (FEUP). I hold an M.Sc. degree in Bioengineering from FEUP (2017). My research focuses on the use of biometric attributes to recognise identity and wellbeing continuously and efficiently. While mainly contributing to stronger and more robust electrocardiogram (ECG) biometrics in realistic conditions, I have also worked on the topics of biometric security, interpretability, and several others related to pattern recognition. Beyond these, 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   **Researcher** at *Easy Ride Project*: In-vehicle activity recognition and wellbeing measurement.

since 07/2019   **Researcher** at *AUTOMOTIVE Project*: Driver drowsiness monitoring using continuous data.

01-09/2018   **Scholarship Researcher** at *CHIC Project*: Quality assessment of print text documents.

Scientific publications

Journal articles (6)

2021   A. F. Sequeira, T. Gonçalves, W. Silva, J. R. Pinto, and J. S. Cardoso, "**An Exploratory Study of Interpretability for Face Presentation Attack Detection**," *IET Biometrics.* `doi:10.1049/bme2.12045` (*in press*)

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* 3 (2): 180–189. `doi:10.1109/TBIOM.2020.3046620`

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 (12)

2021   L. G. Capozzi, P. Carvalho, A. Sousa, C. Pinto, J. R. Pinto, and J. S. Cardoso, "**Impact of visual noise in activity recognition using deep neural networks - an experimental approach**," in *2nd International Conference on Pattern Recognition and Machine Learning (PRML 2021)*, 16 – 18 July, Chengdu, China. (*accepted*)

2021   L. G. Capozzi, J. R. Pinto, J. S. Cardoso, and A. Rebelo, "**End-to-End Deep Sketch-to-Photo Matching Enforcing Realistic Photo Generation**," in *25th Iberoamerican Congress on Pattern Recognition (CIARP'21)*, 10 – 13 May, Porto, Portugal. (*in press*)

2021   L. G. Capozzi, J. R. Pinto, J. S. Cardoso, and A. Rebelo, "**Optimizing Person Re-Identification using Generated Attention Masks**," in *25th Iberoamerican Congress on Pattern Recognition (CIARP'21)*, 10 – 13 May, Porto, Portugal. (*in press*)

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. `doi:10.1007/978-3-030-72660-7_62`

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)

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)

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)

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

Citation record

163 citations   h-index **4**   i10-index **2**   (according to Google Scholar, 22/05/2021)

Student supervision

Master's Dissertations (8 students)

2021 **Co-supervisor of Sofia C. Beco**, M.Sc. Bioengineering, Universidade do Porto
Make My Heartbeat: Generation and Interlead Conversion of ECG Signals.

2021 **Co-supervisor of Inês A. Magalhães**, M.Sc. Bioengineering, Universidade do Porto
Feel My Heart: Emotion Recognition Using the Electrocardiogram.

2021 **Co-supervisor of Telma Esteves**, M.Sc. Biomedical Engineering, Universidade Nova de Lisboa
Sleepy Drivers: Drowsiness Monitoring Using ECG and Face Video.

2020 **Co-supervisor of Arthur J. Matta**, M.Sc. Informatics & Computing Engineering, Universidade do Porto
Open-World Face Recognition.

2020 **Co-supervisor of Leonardo G. Capozzi**, M.Sc. Informatics & Computing Engineering, Universidade do Porto
Face Recognition For Forensic Applications: Methods for Matching Facial Sketches to Mugshot Pictures.

2020 **Co-supervisor of João G. Ferreira**, M.Sc. Informatics & Computing Engineering, Universidade do Porto
Head Pose Estimation for Facial Biometric Recognition Systems.

2020 **Co-supervisor of Carolina Afonso**, M.Sc. Network & Information Systems Engineering, Universidade do Porto
Changing Perspectives: Interlead Conversion in Electrocardiographic Signals.

2019 **Co-supervisor of Gabriel C. Lopes**, M.Sc. Bioengineering, Universidade do Porto
Don't You Forget About Me: Enhancing Long Term Performance in Electrocardiogram Biometrics.

Internships (15 students)

2021 **Supervisor of Mariana Calado**,
Drowsiness detection using ECG signals, at INESC TEC.

2021 **Co-supervisor of Guilherme Barbosa**,
An End-to-End Learnt 2D representation for ECG-Based Biometric Authentication, at INESC TEC.

2021 **Co-supervisor of Duarte Lopes**,
Interpretability for Face Presentation Attack Detection, at INESC TEC.

2020 **Co-supervisor of Susana Lima**,
CTM Summer Internships 2020, at INESC TEC.

2020 **Co-supervisor of João Fonseca**,
NEB Outclass Internship: Face Photograph Analytics, at INESC TEC.

2020 **Co-supervisor of Catarina Lopes**,
Face photograph analytics for automatic assessment of ICAO guideline compliance, at INESC TEC.

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.

Scientific conferences and workshops

2021 **Technical Chair**
17th International Conference on Computational Intelligence Methods for Bioinformatics and Biostatistics (CIBB 2021), November 15–17, Avellino, Italy

2021 **Publicity & Local Organisation Chair**
Workshop on Explainable & Interpretable Artificial Intelligence for Biometrics (xAI4Biometrics) at the *Winter Conference on Applications of Computer Vision (WACV 2021)*, January 5, Waikoloa, United States

2020 **Demo Chair**
8th International Workshop on Biometrics and Forensics (IWBF 2020), April 29–30, Porto, Portugal

2019 **International Programme Committee Member**
15th Mediterranean Conference on Medical and Biological Engineering and Computing (MEDICON 2019), September 26–28, Coimbra, Portugal

2019 **Co-Organiser**
Special Session on Machine Learning in Healthcare Informatics and Medical Biology at the *16th International Conference on Computational Intelligence Methods for Bioinformatics and Biostatistics (CIBB 2019)*, September 4–6, Bergamo, Italy

Other events

2021 **Organisation Team Member** for *VISUM 2021* summer school, Porto, Portugal
2021 **Organisation Team Member** for *OpenDay CTM 2021* event, Porto, Portugal
2021 **Workshop Invited Lecturer** for *12th Symposium on Bioengineering*, Porto, Portugal
2020 **Project Committee Member** for *VISUM 2020* summer school, Porto, Portugal
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

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.

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*;
○ **PeerJ**: *PeerJ Computer Science*;
○ **Sage**: *Journal of Engineering in Medicine (JOEIM)*.

Conferences

○ *ICAD 2021* conference;
○ *ACM Multimedia 2021* conference;
○ *Doctoral Consortium on Engineering 2021* conference;
○ *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 73 reviews verified at Publons, 14 of which rated as excellent by the assigned editors

Professional societies

since 2015 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)
since 2021 Student Member at **EAB** (European Association for Biometrics)

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