

# CURRICULUM VITAE

Rui Fonseca-Pinto  
2019





## DADOS PESSOAIS E FORMAÇÃO ACADÉMICA

### Identificação

**Nome:** Rui Manuel da Fonseca Pinto

**Data de Nascimento:** 25/07/1977

**Nacionalidade:** Portuguesa

**Sexo:** Masculino

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### Morada Profissional:

Instituto Politécnico de Leiria – IPL  
Escola Superior de Tecnologia e Gestão - ESTG,  
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### Morada Pessoal:

Avenida Engenheiro Adelino Amaro da Costa, Lote 21B, 1ªA  
2415-367 Leiria, Portugal

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Profissional: [rui.pinto@ipleiria.pt](mailto:rui.pinto@ipleiria.pt)

### Habilitações Académicas

- Mestrado integrado em Medicina, pela Faculdade de Medicina da Universidade de Lisboa, (2010-2017), com classificação final de 15 valores;
- Doutoramento em Engenharia Biomédica e Biofísica, no Departamento de Física da Faculdade de Ciências da Universidade de Lisboa (2007-2010), aprovado com distinção e louvor com a tese “*Novas abordagens ao estudo de sinais biomédicos: análise tempo-frequência e transformada de Hilbert-Huang*”;
- Curso de Especialização em Biofísica, na área de especialização em Física Médica e Engenharia Biomédica com classificação final de 17 valores;
- Mestrado em Matemática Aplicada (Física-Matemática), Departamento de Matemática da Universidade de Évora (2002-2004), aprovado com classificação de Muito Bom com a tese “*Equação de Schrödinger semilinear (com campo magnético): Instabilidade de estados estacionário com simetria cilíndrica*”;
- Licenciatura em Matemática, no Departamento de Matemática da Universidade de Évora (1996-2001), com classificação final de 15 valores.

## Experiência Letiva

- 09/2000 – 08/2001  
Professor no Ensino Secundário na Escola Secundária D. Sancho II em Elvas (grupo de recrutamento 500);
- 09/2001 – 08/2002  
Professor no Ensino Secundário na Escola Secundária Poeta Al-Berto em Sines (grupo de recrutamento 500);
- 09/2002 – 05/2010  
Equiparado a Assistente de 1º triénio na Escola Superior de Tecnologia e Gestão do Instituto Politécnico de Leiria;
- Desde 05/2010  
Professor Adjunto do Instituto Politécnico de Leiria, lecionando nas Escola Superior de Tecnologia e Gestão (ESTG) e na Escola Superior de Saúde (EssLei).

## Experiência de Investigação

- 2002 – 2009  
Investigador no Instituto de Biofísica e Engenharia Biomédica (IBEB) da Faculdade de Ciências da Universidade de Lisboa ([www.ibeb.fc.ul.pt](http://www.ibeb.fc.ul.pt));
- 2011-2018  
Investigador Integrado no Instituto de Telecomunicações, no grupo de *Multimedia Signal Processing* em Leiria ([www.it.pt](http://www.it.pt));
- Desde 2016  
Investigador Externo Convidado no Laboratório de Bioinformática – LABI, da Universidade Federal do Oeste do Paraná, no campus de Foz do Iguaçu (<http://www.foz.unioeste.br/labi/>).
- Desde 2018  
Investigador Integrado no CiTechCare – Center for Innovative care and health Technology no IPLeia – [www.citechcare.ipleiria.pt](http://www.citechcare.ipleiria.pt)
- Desde 2018  
Investigador colaborador no Instituto de Telecomunicações, no grupo de *Multimedia Signal Processing* em Leiria

## PRODUÇÃO CIENTÍFICA E LINHAS DE INVESTIGAÇÃO

### Capítulos de Livros

- Pereira, Jorge; Mendes, Ana; Nogueira, Conceição; Fonseca-Pinto, Rui, “An Adaptive Approach for Skin Lesion Segmentation” in *Dermoscopy Images Using a Multiscale Local Normalization*. Jean-Pierre Bourguignon; Rolf Jeltsch; Alberto Adrego Pinto; Marcelo Viana. Dynamics, Games and Science. Ed. Cham: Springer International Publishing, 2015, v. 1, p. 537-545;
- Fonseca-Pinto, Rui. “A New Tool for Nonstationary and Nonlinear Signals: The Hilbert-Huang Transform in Biomedical Applications” in *Biomedical Engineering, Trends in Electronics, Communications and Software*. Anthony Laskovski. Ed: InTech, 2011, p. 481-504;
- Fonseca-Pinto, R., Rijo, R., Assunção, P., Seco, M. A., Guarino, M. P., Braga-Pontes, C., Gomes, D., Carreira, B., Correia, P., Oliveira, L., Pires, G., Antunes, A., Januário, F., Martinho, R. (2019, May). Prescribe and Monitor Physical Activity Through a Community-Based eHealth Program: MOVIDA Platform. in *International Medical and Biological Engineering* (pp. 13-19). Springer, Cham.

### Registos de Propriedade Industrial

Pedido de patente PCT/IB2017/055769, o qual reivindicou prioridade do pedido de patente português n.º109633 – Carotidómetro: Um dispositivo médico para avaliação precoce de doença metabólica.

## Journal Papers

- Rui Fonseca-Pinto, Nuno Vieira Lopes, Gabriel Correia Brito, Marlene Lages, Maria Pedro Guarino (2020), Assessing Autonomic Control of Metabolic Diseases by Principal Component Analysis: a data driven methodology, Health and Technology, Springer (aceite)
- Brito, G. C., Fonseca-Pinto, R., Guarino, M. P., Lages, M., & Lopes, N. V. (2018). CBView: Merging Data in Metabolic Diagnosis. *Procedia Computer Science*, 138, 244-249  
<https://doi.org/10.1016/j.procs.2018.10.035>
- Lages, M., Brito, G., Lopes, N., Fonseca-Pinto, R., & Guarino, M. (2019). Predicting metabolic risk in healthy volunteers through assessment of physiological responses to ingestion of different meals. *European Journal of Public Health*, 29 (Supplement\_1), ckz034-048.
- Lee, D., Spolaor, N., Wu, S., Mendes, A., Fonseca-Pinto, R., “Dermoscopic Assisted Diagnosis in Melanoma: Reviewing Results, Optimizing Methodologies and Quantifying Empirical Guidelines”, *Knowledge-Based Systems*, 158, 9-24, 2018;  
<https://doi.org/10.1016/j.knosys.2018.05.016>
- Santos. J., Assuncao. P., Cruz. L., Távora. L., Fonseca-Pinto. R., Faria. S., “Lossless Coding of Light Field Images based on Minimum-Rate Predictors”, *Journal of Visual Communication and Image Representation*, 54, 21-30, 2018;  
<https://doi.org/10.1016/j.jvcir.2018.03.003>
- Gonzalez, M., Azul, Guzman., Nicolas, M., Fonseca-Pinto, R., Trivi, M., Rabal, H., Passoni, I. L., “Qualitative characterization of skin tissue with Dynamic Laser Speckle”, *Revista Argentina de Bioingenieria*, 22(1), 2018;
- Bento, Luis; Fonseca-Pinto Rui; Póvoa, Pedro, “Monitorização do sistema Nervoso Autónomo em Ambiente de Cuidados Intensivos”, *Rev. Bras. Ter. Intensiva*; 29(4), pp. 481-489, 2017;  
<http://dx.doi.org/10.5935/0103-507x.20170072>.
- Sacramento, Joana F.; Ribeiro, Maria J.; Rodrigues, Guarino, Maria, P.; Fonseca-Pinto, Rui; Conde, S. “Functional abolition of carotid body activity restores insulin action and glucose homeostasis in rats: key roles for visceral adipose tissue and the liver”. *Diabetologia*, V. 60, n. 1, pp. 158-168, 2017;  
<http://dx.doi.org/10.1007/s00125-016-4133-y>
- João M. Santos; Pedro A. A. Assunção; Luis A. Silva Cruz; Fonseca-Pinto, Rui; Távora, Luis; Faria, Sérgio, “Performance evaluation of light field pre-processing methods for lossless standard coding”. *IEEE COMSOC MMTTC Communications*, v. 12, n. 4, pp. 44-49, 2017.  
[http://mmc.committees.comsoc.org/files/2015/08/MMTC\\_Communication\\_Frontier\\_July\\_2017\\_singlecolumn\\_v1.pdf](http://mmc.committees.comsoc.org/files/2015/08/MMTC_Communication_Frontier_July_2017_singlecolumn_v1.pdf)
- Machado, Marlene; Pereira, Jorge; Fonseca-Pinto, Rui. “Reticular pattern detection in dermoscopy: an approach using Curvelet Transform”, *Research on Biomedical Engineering*, V. 32, n. 2, pp. 129-136, 2016.  
<http://dx.doi.org/10.1590/2446-4740.00315>
- Mendes, Ana Isabel; Nogueira, Conceição; Pereira, Jorge, Fonseca-Pinto, Rui, “On the geometric modulation of skin lesion growth: a mathematical model for melanoma”, *Research on Biomedical Engineering*, v. 32, n. 1, p. 44-54, 2016.  
[http://www.scielo.br/scielo.php?pid=S2446-47402016000100044&script=sci\\_abstract](http://www.scielo.br/scielo.php?pid=S2446-47402016000100044&script=sci_abstract)

- Seco, M. A., Fonseca-Pinto, R, “Physiological dynamics of heart rate variability: a statistical modeling approach in vasovagal syncope”. *Millenium-Journal of Education, Technologies, and Health*, (1), pp. 39-47, 2016.
- Sacramento, J., Fonseca-Pinto, R., Guarino, M., Conde, S., “Decreased endogenous insulin production improves whole-body insulin sensitivity: is this a sympathetically mediated effect?”, *Autonomic Neuroscience: Basic and Clinical*, Volume 192 , pp. 27 – 28, 2016.  
[https://www.autonomicneuroscience.com/article/S1566-0702\(15\)00400-2/abstract](https://www.autonomicneuroscience.com/article/S1566-0702(15)00400-2/abstract)
- Pereira, J., Fonseca-Pinto, R. “Segmentation strategies in dermoscopy to follow-up melanoma: combined segmentation scheme”, *The Online Journal of Science and Technology*, 5(3), pp. 56-61, 2015.  
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- Machado, Marlene; Pereira, Jorge; Fonseca-Pinto, Rui. “Classification of reticular pattern and streaks in dermoscopic images based on texture analysis”, *Journal of Medical Imaging*, v. 2, n. 4, pp. 044503-044503, 2015.
- Mariana Marçal; Nádia Augusto; Sara Janela; Emanuel Vital; Paula Parreira; Maria Guarino; Maria Dixe; Rui Fonseca-Pinto, “Avaliação funcional em diabéticos tipo 2 com risco médio e elevado de pé diabético”, *Revista Portuguesa de Diabetes*, v. 9, n. 2, pp. 73-82, 2014.
- Fonseca-Pinto R. “Processamento de imagem digital e cancro de pele : uma abordagem interdisciplinar”, *Scripta-Ingenia*, n. 2, pp. 3-11, 2014.  
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- Caseiro, P., Fonseca-Pinto, R., Andrade, A. “Screening of obstructive sleep apnea using Hilbert–Huang decomposition of oronasal airway pressure recordings”, *Medical Engineering & Physics*, v. 32, n. 6, pp. 561-568, 2010.
- Fonseca-Pinto, R., Ducla-Soares, J.L., Araújo, F., Andrade, A. “On the influence of time-series length in EMD to extract frequency content: Simulations and models in biomedical signals”, *Medical Engineering & Physics*, v. 31, n. 6, pp. 713-719, 2009.

## Conference Proceedings

- Lages, M., Ribeiro, I., Brito, G. C., Lopes, N. V., Fonseca-Pinto, R., Carvalho, L., Guarino, M. P. (2019). Profiling cardiometabolic responses in response to a mixed meal in healthy volunteers. *Obesity Facts*, 12(suppl 1):252.  
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<http://dx.doi.org/10.1093/eurpub/ckz034.048>
- Lages M., Ribeiro I., Brito G. C., Fonseca-Pinto R., Carvalho L., Lopes N. V., Guarino M. P. (2019). CBmeter: um estudo piloto em voluntários saudáveis para avaliação das respostas metabólicas e cardiorrespiratórias à PTGO versus refeição mista padrão. *Revista Portuguesa de Diabetes*, 14 (1) Suppl: 34.
- Guarino, M. P., Brito, G., Lages, M., Fonseca-Pinto, R., Lopes, N. (2018). CBmeter - a new medical device for early screening of metabolic diseases. *BMC Health Services Research*, 18(Suppl 2):3-4.  
<http://dx.doi.org/10.1186/s12913-018-3444-8>
- J. Figueiredo, G. Gordalina, G. Pires, L. Oliveira, P. Correia, R. Rijo, R. Martinho, R. Fonseca-Pinto, "Recognition of human activity based on sparse data collected from smartphone sensors" 2019 IEEE 6th Portuguese Meeting on Bioengineering (ENBENG), Lisbon, Portugal, 2019, pp. 1-4.  
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- Frazão, A., Costa, A., Teixeira, B., Santo, M., Brito, G., Lages, M., & Guarino, M. P. (2018). Development of a mixed-meal that impacts carotid-body mediated cardiorespiratory and metabolic parameters-a pilot study. *Acta Portuguesa de Nutrição*, no. 13, p. 42.  
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- Bento, L., Cunha, F., Távora, L., Assunção, P., Faria, S., & Fonseca-Pinto, R. (2019, May). A Methodology for Laser Speckle Simulation in Controlled Dynamic Processes. In 2019 42nd International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO) (pp. 326-329). IEEE.  
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- Pereira Pedro MM, Rui Fonseca-Pinto, Rui Pedro Paiva, Távora Luis, Assuncao Pedro AA, MM de Faria Sergio, Accurate Segmentation of Dermoscopic Images based on Local Binary Pattern Clustering, In 2019 42nd International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO) (pp. 314-319). IEE  
<http://dx.doi.org/10.23919/10.23919/MIPRO.2019.8757023>
- Santos, J. M., Assuncao, P. A., da Silva Cruz, L. A., Tavora, L. M., Fonseca-Pinto, R., & Faria, S. M. (2019). Lossless Compression of Light Fields Using Multi-reference Minimum Rate Predictors. In 2019 Data Compression Conference (DCC) (pp. 408-417). IEEE.  
<http://dx.doi.org/10.1109/DCC.2019.00049>
- S.M.M. Faria, Pedro M. M. Pereira, R. Pinto, R. Paiva, L.M. Távora, P.A. Assunção, Transfer Learning of ImageNet Neural Network for Pigmented Skin Lesion Detection, Portuguese Conf. on Pattern Recognition (RecPad), Coimbra, Portugal, Vol., pp. 26-27, October, 2018.  
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- Pedro M. M. Pereira, L.M. Távora, R. Pinto, R. Paiva, P.A. Assunção, S.M.M. Faria, Image Segmentation using Gradient-based Histogram Thresholding for Skin Lesion Delineation, International Conference on Bioimaging (INSTICC), Praga, Czech Republic, Vol. -, February, 2019.  
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- S.M.M. Faria, J. Filipe, Pedro M. M. Pereira, L.M. Távora, P.A. Assunção, M. Santos, R. Pinto, F. Santiago, V. Dominguez, M. Henrique, Light Field Image Dataset of Skin Lesions, IEEE International Engineering in Medicine and Biology Conference (IEEE EMBS), Berlin, Germany, Vol., pp. 3905-3908, July, 2019.  
<http://dx.doi.org/10.1109/EMBC.2019.8856578>
- S.M.M. Faria, M. Santos, P.A. Assunção, L.M. Távora, L. A. Thomaz, Pedro M. M. Pereira, R. Pinto, F. Santiago, V. Dominguez, M. Henrique, Dermatological Imaging using a Focused Plenoptic Camera: the SKINL2 Light Field Dataset, Conference on Telecommunications (ConfTele), Lisboa, Portugal, Vol1, June, 2019  
<https://www.it.pt/Publications/PaperConference/34765>
- L. Bento, L. Távora, P. Assunção, S. Faria and R. Fonseca-Pinto, "Using local binary patterns in speckle image analysis," 2018 41st IEEE/ International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO), Opatija, Croatia, 2018, pp. 0167-0171.  
<http://dx.doi.org/10.23919/MIPRO.2018.8400033>
- R. Lourenco, P. A. A. Assuncao, L. M. N. Tavora, R. Fonseca-Pinto and S. M. M. Faria, "Silhouette Enhancement in Light Field Disparity Estimation Using the Structure Tensor," 2018 25th IEEE International Conference on Image Processing (ICIP), Athens, 2018, pp. 2580-2584.  
<http://dx.doi.org/10.1109/ICIP.2018.8451848>
- J. M. Santos, P. A. A. Assuncao, L. A. da Silva Cruz, L. Távora, R. Fonseca-Pinto and S. M. M. Faria, "Lossless light-field compression using reversible color transformations," 2017 Seventh International Conference on Image Processing Theory, Tools and Applications (IPTA), Montreal, QC, 2017, pp. 1-6.  
<http://dx.doi.org/10.1109/IPTA.2017.8310154>
- J. N. Filipe, L. M. N. Tavora, P. A. A. Assuncao, R. Fonseca-Pinto and S. M. M. de Faria, "Evaluation of Focus Metrics in Extended Depth-of-field Reconstruction," 2018 Tenth International Conference on Quality of Multimedia Experience (QoMEX), Cagliari, 2018, pp. 1-6.  
<http://dx.doi.org/10.1109/QoMEX.2018.8463366>
- L. Bento, L. Távora, P. Assunção, S. Faria and R. Fonseca-Pinto, "Evaluation of cutaneous microcirculation patterns by laser speckle imaging," 2018 41st IEEE/ International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO), Opatija, Croatia, 2018, pp. 0290-0293.  
<http://dx.doi.org/10.23919/MIPRO.2018.8400055>
- Fonseca-Pinto, Rui; Machado, Marlene. A textured scale-based approach to melanocytic skin lesions in dermoscopy. IEEE 40th International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO), p. 279-282, 2017.  
<http://dx.doi.org/10.23919/MIPRO.2017.7973434>
- Machado, Marlene; Pereira, Jorge; Silva, Miguel, Fonseca-Pinto, Rui. Finding a signature in dermoscopy: A color normalization proposal. IEEE 40th International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO), p. 276-278, 2017.  
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- Sacramento, J.; Fonseca-Pinto, R.; Guarino, M.P.; Monteiro, E; Conde, S.; Decreased endogenous insulin production improves whole-body insulin sensitivity: is this a sympathetically mediated effect?. Proceedings of the International Society of Autonomic Neuroscience ISAN2015 Stresa., v. 192, p. 27-28. 2015.  
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- Fonseca-Pinto, R., Carrão, L., & Macedo, C. Momento de Inércia do Membro Superior: Estudo comparativo pelo método pendular, Proceedings do 6 Congresso Nacional de Biomecânica, Monte Real, 2015, 3-5.
- Fonseca-Pinto, Rui. Regularity Measures for Autonomic Nervous System Data: Pseudoentropy as a Dynamic Marker. Signal and Image Processing (SIP). Calgary, AB, 759-052 Canada: ACTAPRESS, 2011.  
<https://doi.org/10.2316/P.2011.759-052>
- Caseiro, P.; Fonseca-Pinto, Rui; Andrade, A. Screening of obstructive sleep apnoea in awake subjects. Journal of Sleep Research, v. 21, n. 1, p. 1-371, 2012.  
<https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.1365-2869.2012.01044.x>
- Fonseca-Pinto R. Image Empirical Mode Decomposition (IEMD) in Dermoscopic Images: Artefact Removal and Lesion Border Detection, Conference Proceedings of Signal Processing, Pattern Recognition and Applications (SPPRA). 341-345, Acta Press, 2009.  
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## Abstracts in Conference Proceedings

- Rui Fonseca-Pinto, Emanuel Silva, Rui Rijo, Ricardo Martinho, Bruno Carreira, MOVIDA.polis: Physical Activity mHealth Based Platform, International Journal of Sport and Health Sciences Vol:13, No:9, 2019
- Lages M, Pontes C, Fonseca-Pinto R, Guarino MP, Assessing cardiorespiratory and metabolic parameters responses to a mixed meal vs a glucose challenge- a pilot study in healthy volunteers, 14-16 september 2018, London (Accepted)
- Frazão A, Costa A, Teixeira B; Santo M, Brito G, Lages M, Lopes N, Fonseca-Pinto R, Pereira P, Guarino MP, Development of a mixed-meal that impacts carotid-body mediated cardiorespiratory and metabolic parameters - a pilot study, I Congresso Internacional de Alimentação e Nutrição e XVII Congresso de Nutrição e Alimentação, 10-11 maio, 2018, Lisboa.
- Bento, L., Távora, L., Assunção, P., Faria, S., & Fonseca-Pinto, R. Dynamic Laser Speckle in Medical Imaging: On the quantification of skin patterns. Encontro Nacional de Novos Investigadores em Saúde & International Meeting of New Health researchers, Vol2, pp. 36, 2017.
- Ana Mendes, Huei D. Lee, Newton Spolaôr, Jefferson T. Oliva, Wu F. Chung, Rui Fonseca-Pinto, Enlightening the human decision in health: The skin melanocytic classification challenge. 3rd IPLeia's International Health Congress. BMC Health Services Research, 2016, v. 16 (Suppl 3):200
- Diana Duarte; Nuno Vieira Lopes; Fonseca-Pinto R. Blood pressure assessment during standard clinical manoeuvres: A non-invasive PPT based approach; 3rd IPLeia's International Health Congress. BMC Health Services Research, 2016, v. 16 (Suppl 3):200
- Diana Duarte; Nuno Vieira Lopes; Fonseca-Pinto R, Pulse transit time estimation for continuous blood pressure measurement: A comparative study; 3rd IPLeia's International Health Congress. BMC Health Services Research, 2016, v. 16 (Suppl 3):200
- Mendes, A. I.; Nogueira, C.; Baptista, D.; Pereira, J.; Fonseca-Pinto, R.; Growth Model in Melanocytic Sin Lesions: A Geometric Look to Skin Pigmented Lesions, 2nd IPLeia International Health Congress | Challenges & Innovation in Health. 2014, v. 48.
- Fonseca-Pinto, R; Sacramento, J.; Diogo, L; Guarino, M.; Monteiro, E.; Conde, S.; Validation of a Sympathovagal Balance Model to Evaluate Autonomic Function in Rats using Time-Frequency Analysis. World Congress on Medical Physics & Biomedical Engineering. IUPESM 2015, Canadá, 2015.
- Mariana Marçal, Nádia Augusto, Sara Janela I, Emanuel Vital, Paula Parreira; Rui Fonseca-Pinto; Type2 Diabetes and risk of fall: Functionality assessment and risk group in diabetic foot. Rev Saúde Pública 2014;48(n.esp): pp.43.
- Mendes, Ana I; Nogueira, Conceição; Baptista, Diogo; Pereira, Jorge; R, Fonseca-Pinto. Growth Model in Melanocytic Sin Lesions: A Geometric Look to Skin Pigmented Lesions, IPLeia's Health Congress, Rev Saúde Pública 2014;48(n.esp): pp.288.
- Bento, Luis N; R, Fonseca-Pinto. 2014. Autonomic Nervous System Balance: Classic Analysis versus Time-Frequency Analysis; IPLeia's Health Congress, Rev Saúde Pública 2014;48(n.esp): pp.289.

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- Baptista, Diogo; Mendes, Ana I; Nogueira, Conceição; Pereira, Jorge; R, Fonseca-Pinto; Charaterization and Evaluation of Skin Lesions Using Symbolic Dynamics; IPLeiria's Health Congress, Rev Saúde Pública 2014;48(n.esp): pp.290.
- Pereira, Jorge; Mendes, Ana I; Nogueira, Conceição; Baptista, Diogo; R, Fonseca-Pinto. A Novel Method for Skin Lesion Segmentation Using a Multi-Scale Local Normalization; IPLeiria's Health Congress, Rev Saúde Pública 2014;48(n.esp): pp.292.
- Rodrigues, A.; Fonseca-Pinto R. Phonocardiographyc Characterization by Time-Frequency Analysis: The Hilbert Huang Transform Approach . In: CONFTELE, 2015. Aveiro. Proceedings of the CONFTELE2016. 2015.

### Posters in International Conferences

- Alexandra N. Baptista; Nogueira, Conceição; Cidália Macedo, Ferreira, Liliana; Baptista, Diogo; Fonseca-Pinto, Rui. A luz e as suas propriedades vão a escolas básicas. Investigação, Práticas e Contextos em Educação. Portugal. 2016.
- Alexandra N. Baptista; Nogueira, Conceição; Cidália Macedo, Ferreira, Liliana; Baptista, Diogo; Fonseca-Pinto, Rui; CiênciaLIZar – Centro de Recursos para o Ensino das Ciências. Investigação, Práticas e Contextos em Educação. Portugal, 2016.
- Fonseca-Pinto, R, Rui Fonseca-Pinto, Maria P. Guarino, Joana Sacramento, Jesus Prieto, Miguel Mota- Carmo, Silvia V. Conde. Metodologia de acesso instantâneo à modulação autonómica do sistema cardiovascular: balanço vago-simpático e análise tempo-frequência. Congresso Português de Cardiologia, 23-28 de abril 2016, Vilamoura, Portugal
- Hugo Parreiras; Sérgio Faria; Fonseca-Pinto R. Accessing to the autonomic nervous system regulation by integrating ECG and accelerometer data. Hcist. Portugal, 2012.
- Fonseca-Pinto R; Laura Hughes; J Rowe, Andrade A.; Empirical Mode Decomposition Phase-Locking of Magnetoencephalography Mismatch-Negativity Data. Human Brain Mapping. Canadá. 2011.

## Projetos de Investigação

### 1. Plenoptic imaging for skin lesion assessment- PlenoISLA

- **Papel:** Investigador
- **Referência:** FCT - 02/SAICT/2017 – 28325;
- **Financiamento:** 239 304 Euros.
- **Período de Execução:** 2017- 2021

**Resumo:** This project proposes the development and implementation of new imaging techniques for non-invasive skin surface characterization, based on recent light field imaging technology. The main objective is to obtain a new set of 3D-based quantitative markers associated to physiological processes of the skin, allowing the characterization of its morphological and functional structure, that can then be used as markers in evolution and prognosis in Dermatology studies. Based on the obtained skin's 3D characteristics, new patterns of dermoscopy will be considered, leading to the definition of clusters of features and dermoscopic patterns to be used in the context of automatic learning algorithms, in particular within the scope of "Deep Learning". Besides the computational analysis, new techniques for acquisition and compression of the light field images will also be addressed, as well as a database with skin lesion plenoptic images that will be created for the scientific community;

### 2. Physical Activity Monitoring Platform - MOVIDA

- **Papel:** Investigador Responsável
- **Referência:** FCT - 02/SAICT/2016 – 23878;
- **Financiamento:** 150 000 Euros.
- **Período de Execução:** 2017 – 2019

**Resumo:** Chronic diseases prevention and management joint with rehabilitation programs establishes a true challenge to the health care community. Epidemiological studies point to an increased prevalence of cardiovascular and chronic diseases, and specifies the supervised physical activity as a strong tool to control the progression thereof.

This project will create a global health community program, centered in a platform with a mobile App and a dashboard, aimed to monitor physical activity, being divided into 4 main modules, targeting several branches of the population. This program enables exercise prescription and monitor user's performance and adherence, in metabolic diseases patients by (MOVIDA.cronos), to draw and follow a cardiac rehabilitation program (MOVIDA.eros), to track and quantify indoor movements (MOVIDA.domus), and also to access to a stratified training circuit, for maintain or improve fitness level (MOVIDA.polis).

The project enrolls three academic partners and included research institutes, but also health and community stakeholders. Students from engineering and health sciences will be integrated in the project, benefiting of this interdisciplinary environment;

### 3. A New Medical Device For Screening Metabolic Diseases- CBMeter

- **Papel:** Investigador
- **Referência:** FCT - 02/SAICT/2016 – 23278;
- **Financiamento:** 150 000 Euros.
- **Período de Execução:** 2017 – 2019

**Resumo:** Type 2 diabetes mellitus (T2DM) is a highly prevalent disease worldwide which is asymptomatic in about 44% of patients being critical to search for new ways of early diagnosis. Recent studies have demonstrated that the etiology of this disease may be associated with alterations in the function of the carotid body (CB), a chemosensor organ located within the bifurcation of the carotid artery. In animal models of metabolic syndrome it was observed that the CBs are overactivated, causing an increase in sympathetic nervous system tone, underlying diseases such as obesity, hypertension and T2DM. This discovery provided a new paradigm for Neuroendocrinology, suggesting that diagnostic function of the CBs has predictive value for the development of metabolic diseases. Despite this fact, it is not common in clinical practice to look at the CBs as organs associated with endocrine dysfunction and we believe this is probably due to the nonexistence of a user-friendly, portable medical device that diagnosis the function of the CBs, together with sympathetic and metabolic function assessment. Thus, this project aims to answer this need, with the objective of building an equipment to evaluate the function of the carotid body – a CBmeter.

#### 4. Light Field Laser Speckle in Medical Applications - LFSL

- **Papel:** Investigador Responsável
- **Referência:** UID/EEA/50008;
- **Financiamento:** 40 000 Euros.
- **Período de Execução:** 2016 – 2019

**Resumo:** Laser speckle is an interference phenomenon that is observed when coherent light (e.g.laser ) is scattered from a diffusing surface. In general, a speckle pattern is a random pattern whose properties can be described using stochastics and probabilistic laws.

New image processing techniques have been used to quantify the change in the speckle pattern, as a consequence of the micromovements ( in dynamic speckle) of the surfaces being studied. These techniques include Pattern Analysis and unsupervised Machine Learning algorithms whose study is being done in our research group. The use of stereoscopic speckle analysis is also under study in the context of skin microcirculation analysis.

Speckle imaging is a noninvasive imaging technology having high potential in terms of industrial applications and material engineering, but also in the context of Medical Imaging, which is the main research interest within LaserLabMed research team;

#### 5. Feature extraction and artifact removal in Dermoscopy - DERMCLASS

- **Papel:** Investigador Responsável
- **Referência:** CENTRO-07-ST24-FEDER-002024;
- **Financiamento:** 58 823 Euros.
- **Período de Execução:** 2014 - 2016
- **Resumo:** To improve a quantitative clinical assessment diagnosis in dermoscopic images was the main motivation in this research project. This objective is closely related with the need of tools to access the dermatologista in the skin lesion classification challenge. Artifact removal in dermoscopy is an important pre-processing task in order to maintain the key anatomical structures and this selective filtering is central to an accurate diagnosis. Automatic lesion border detection and feature identification is also crucial to follow the progression/regression of skin lesions, and to define markers as growth rate and boundary shape. This task is extremely dependent on the previous one, as the incorrect artefact removal (hairs and air bubbles) conducts to artificial borders, compromising diagnostic metrics. Classification system of malignancy in lesions uses automatic feature identification (ABCD rule, and 7 point check-list) or other similar semi-qualitative approaches proposed by a few experts all over the world. Nowadays each diagnostic category within the realm of pigmented skin lesions is characterized by few global patterns and a rather distinctive combination of specific local features. Feature identification might help for the identification of diagnostic clues, and feature extraction also can be used to propose a quantitative measure of malignancy using geometric characteristics of lesion borders growth (linear, fractal, chaotic,...).

#### 6. Mapping the Sympathetic Efferent Activity in Carotid-Body Mediated Insulin Resistance – SYMPATH

- **Papel:** Investigador
- **Referência:** FCT - EXPL/NEU-SCC/2183/2013;
- **Financiamento:** 48 371 Euros.
- **Período de Execução:** 2014 - 2015
- **Resumo:** To improve a quantitative clinical assessment diagnosis in dermoscopic images was the main motivation in this research project. This objective is closely related with the need of tools to access the dermatologista in the skin lesion classification challenge. Artifact removal in dermoscopy is an important pre-processing task in order to maintain the key anatomical structures and this selective filtering is central to an accurate diagnosis. Automatic lesion border detection and feature identification is also crucial to follow the progression/regression of skin lesions, and to define markers as growth rate and boundary shape. This task is extremely dependent on the previous one, as the incorrect artefact removal (hairs and air bubbles) conducts to artificial borders, compromising diagnostic metrics. Classification system of malignancy in lesions uses automatic feature identification (ABCD rule, and 7 point check-list) or other similar semi-qualitative approaches proposed by a few experts all over the world. Nowadays each diagnostic category within the realm of pigmented skin lesions is characterized by few global patterns and a rather distinctive combination of specific local features. Feature identification might help for the identification of diagnostic clues, and feature extraction also can be used to propose a quantitative measure of malignancy using geometric characteristics of lesion borders growth (linear, fractal, chaotic,...).

## ATIVIDADE PEDAGÓGICA

Atividade pedagógica com início no ano 2000 ao nível do ensino secundário. Após ingresso no ensino superior em 2002, lecionou inicialmente na área da Matemática e Física na ESTG, e posteriormente tem lecionado na área de fronteira entre as Ciências de Base e de Engenharia e as ciências da Saúde.

As unidades curriculares de que foi responsável encontram-se em seguida:

- **Cursos de Licenciatura em Engenharia (várias)**
  - Matemática I
  - Matemática II
  - Matemática Aplicada
  - Biofísica I
- **Curso de Licenciatura em Tecnologia dos Equipamentos de Saúde**
  - Sistemas de Imagiologia - desde 2007/2018 ate 2014/2015
  - Física Geral - desde 2007/2018 ate 2014/2015
- **Cursos de Especialização Tecnológica (CET) e Cursos Técnicos Superiores Profissionais (CTeSP)**
  - Fundamentos de Matemática
- **Pós Graduação em Terapia da Mão**
  - Anatomia Funcional e Biomecânica – 2014/2015;
  - Imagiologia – 2014/2015;
- **Curso de Licenciatura em Terapia Ocupacional**
  - Biomecânica e Movimento Humano –2011/2019
  - Anatomia - 2016/18
  - Fisiologia de Esforço – 2014/2019
  - Doença, Avaliação e Diagnóstico - 2016/2019
- **Curso de Licenciatura em Fisioterapia**
  - Biofísica – 2011 - 2017
  - Cinesiologia e Biomecânica – 2011 – 2017
- **Curso de Licenciatura em Ciências da Informação em Saúde**
  - Tecnologias de Diagnóstico e Imagiologia Médica – 2017-2018

### Outras atividades

- Membro fundador da equipa do projeto CienciaLIZar ([www.ciencializar.ipleiria.pt](http://www.ciencializar.ipleiria.pt)). Trata-se de um centro de recursos que promove a cultura científica e a descoberta da ciência pela experiência e pela tecnologia. Neste âmbito, o candidato tem também realizado palestras nas escolas secundárias no sentido de demonstrar a aplicação das ciências de base (Matemática, Física, Biologia e Química) em problemas relacionados com a melhoria dos cuidados de saúde, contribuindo desta forma para proporcionar aos alunos uma visão externa à sala de aula relativa centrados na aplicabilidade dos conceitos em que se estão a iniciar.
- **Formador certificado** pelo Conselho Científico-Pedagógico da Formação Contínua de Professores (<http://www.ccpfc.uminho.pt>) do Ministério da Educação com formações acreditadas e lecionadas a professores dos Ensinos Básico e Secundário.
- Participação em programas de Mobilidade para docentes no âmbito do Ensino Superior (Erasmus e Eureka)

