

CURRICULUM VITAE

Rui Fonseca-Pinto
2023





DADOS PESSOAIS E FORMAÇÃO ACADÉMICA

Identificação

Nome: Rui Manuel da Fonseca Pinto

Morada Profissional:

Instituto Politécnico de Leiria – IPL
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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);
- 2011-2018
Investigador Integrado no Instituto de Telecomunicações, no grupo de *Multimedia Signal Processing* em Leiria (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
- 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

- Spolaôr, N., Fonseca-Pinto, R., Mendes, A. I., Ensina, L. A., Takaki, W. S., Parmezan, A. R., ... & Lee, H. D. (2021). Evaluating Intelligent Methods for Decision Making Support in Dermoscopy Based on Information Gain and Ensemble. *Computational Intelligence for Business Analytics*, 111-127.
- Fonseca-Pinto, R., Lopes, N.V., Brito, G.C. et al. Assessing autonomic control of metabolic syndrome by principal component analysis: a data driven methodology. *Health Technol.* 10, 79–85 (2020)
- 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.
- 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;

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.

Pedido de patente europeu N°21207989.1 "PROCESSO DE DETEÇÃO MICROBIOLÓGICA E DETERMINAÇÃO DA SUSCEPTIBILIDADE ANTIMICROBIANA EM AMOSTRAS BIOLÓGICAS E AMBIENTAIS

Journal Papers

- Ferreira, J. B., Cabral, M., Santos, R., Ferreira, M. S., Fonseca-Pinto, R., Antunes, A., & Januário, F. (2023). Hybrid cardiac telerehabilitation after acute coronary syndrome: self-selection predictors and outcomes. <https://doi.org/10.5195/ijt.2023.6475>
- Silva, C. J., Cantin, G., Cruz, C., Fonseca-Pinto, R., Passadouro, R., Dos Santos, E. S., & Torres, D. F. (2022). Complex network model for COVID-19: human behavior, pseudo-periodic solutions and multiple epidemic waves. *Journal of mathematical analysis and applications*, 514(2), 125171. <https://doi.org/10.1016/j.jmaa.2021.125171>
- Pereira, P. M., Thomaz, L. A., Tavora, L. M., Assuncao, P. A., Fonseca-Pinto, R., Paiva, R. P., & Faria, S. M. (2022). Multiple Instance Learning Using 3D Features for Melanoma Detection. *IEEE Access*, 10, 76296-76309. [10.1109/ACCESS.2022.3192444](https://doi.org/10.1109/ACCESS.2022.3192444)
- Marques, C., Matos, C., Cavaleiro, J., Simões, J., Fonseca-Pinto, R., Lopes, N. V., & Ribeiro, J. M. (2022). Avaliação de sistemas posturais da pélvis numa pessoa com Distrofia Muscular do tipo Cinturas: resultados da análise a três almofadas na promoção do equilíbrio dinâmico. *RevSALUS-Revista Científica Internacional da Rede Académica das Ciências da Saúde da Lusofonia*, 4(1). <https://doi.org/10.51126/revsalus.v4i1.193>
- Lourenco, R. M., Tavora, L. M., Assuncao, P. A., Thomaz, L. A., Fonseca-Pinto, R., & Faria, S. M. (2022). Enhancement of light field disparity maps by reducing the silhouette effect and plane noise. *Multidimensional Systems and Signal Processing*, 33(2), 1-33. <https://doi.org/10.1007/s11045-021-00807-7>
- Carvalho, M., Cabral, M., Ferreira, J. B., Santos, R., Fonseca-Pinto, R., Januario, F., ... & Morais, J. (2022). Phase III impact of telerehabilitation in patients with coronary heart disease. *European Journal of Preventive Cardiology*, 29(Supplement_1), zwac056-237. <https://doi.org/10.1093/eurjpc/zwac056.237>
- Conde, S. V., Sacramento, J. F., Melo, B. F., Fonseca-Pinto, R., Romero-Ortega, M. I., & Guarino, M. P. (2022). Blood pressure regulation by the carotid sinus nerve: clinical implications for carotid body neuromodulation. *Frontiers in Neuroscience*, 15, 725751. <https://doi.org/10.3389/fnins.2021.725751>
- Pereira, P. M., Thomaz, L. A., Tavora, L. M., Assuncao, P. A., Fonseca-Pinto, R. M., Paiva, R. P., & de Faria, S. M. (2022). Melanoma classification using light-Fields with morlet scattering transform and CNN: Surface depth as a valuable tool to increase detection rate. *Medical Image Analysis*, 75, 102254. <https://doi.org/10.1016/j.media.2021.102254>
- Lages, M., Carvalho, L., Feijó, S., Vieira, A., Fonseca-Pinto, R., & Guarino, M. P. (2021). CBmeter study: protocol for assessing the predictive value of peripheral chemoreceptor overactivation for metabolic diseases. *BMJ open*, 11(8), e042825. <http://dx.doi.org/10.1136/bmjopen-2020-042825>

- Cabral, M., Santos, R., Januario, F., Antunes, A., & Fonseca-Pinto, R. (2021). Hybrid cardiac rehabilitation program as a potential enhancer of adherence to cardiac rehabilitation in smoking patients with coronary heart disease-a retrospective single-centre analysis. *European Journal of Preventive Cardiology*, 28(Supplement_1), zwab061-347.
<https://doi.org/10.1093/eurjpc/zwab061.347>
- Silva, C. J., Cruz, C., Torres, D. F., Munuzuri, A. P., Carballosa, A., Area, I., ... & Mira, J. (2021). Optimal control of the COVID-19 pandemic: controlled sanitary deconfinement in Portugal. *Scientific reports*, 11(1), 3451.
<https://doi.org/10.1038/s41598-021-83075-6>
- Lages, M., Brito, G. C., Lopes, N. V., Fonseca-Pinto, R., Feijo, S., Vieira, A., ... & Guarino, M. P. (2020, September). The CBmeter pilot study: assessment of carotid body function aimed at early diagnosis of metabolic dysfunction. In *DIABETOLOGIA* (Vol. 63, No. SUPPL 1, pp. S352-S352). ONE NEW YORK PLAZA, SUITE 4600, NEW YORK, NY, UNITED STATES: SPRINGER.
- Pereira, P. M., Fonseca-Pinto, R., Paiva, R. P., Assuncao, P. A., Tavora, L. M., Thomaz, L. A., & Faria, S. M. (2020). Dermoscopic skin lesion image segmentation based on Local Binary Pattern Clustering: Comparative study. *Biomedical Signal Processing and Control*, 59, 101924.
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- Pereira, P. M., Fonseca-Pinto, R., Paiva, R. P., Assuncao, P. A., Tavora, L. M., Thomaz, L. A., & Faria, S. M. (2020). Skin lesion classification enhancement using border-line features–The melanoma vs nevus problem. *Biomedical Signal Processing and Control*, 57, 101765.
<https://doi.org/10.1016/j.bspc.2019.101765>
- Pereira, P. M., Tavora, L. M., Fonseca-Pinto, R., Paiva, R. P., Assunção, P. A. A., & de Faria, S. M. (2019, February). Image Segmentation using Gradient-based Histogram Thresholding for Skin Lesion Delineation. In *Bioimaging* (pp. 84-91).
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- 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;
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<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;
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- 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.
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[https://www.autonomicneuroscience.com/article/S1566-0702\(15\)00400-2/abstract](https://www.autonomicneuroscience.com/article/S1566-0702(15)00400-2/abstract)
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- 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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Conference Proceedings

- Pinheiro, R., Santos, S., Vieira-Lopes, N., & Fonseca-Pinto, R. (2023). Metodologias de acesso à função do Sistema Nervoso Autónomo. *RevSALUS-Revista Científica Internacional da Rede Académica das Ciências da Saúde da Lusofonia*, 5(Sup), 74-75.
<https://doi.org/10.51126/revsalus.v5iSup.597>
- Ferreira, F., Alves, J., Antunes, A., Januário, F., & Fonseca-Pinto, R. (2023). Prescrição do tipo intervalado na Fase III de programas de reabilitação cardíaca: um estudo de caso. *RevSALUS-Revista Científica Internacional da Rede Académica das Ciências da Saúde da Lusofonia*, 5(Sup), 28-29.
<https://doi.org/10.51126/revsalus.v5iSup.537>
- Santos, S., Pinheiro, R., & Fonseca-Pinto, R. (2023). Caraterização autonómica da insuficiência cardíaca. *RevSALUS-Revista Científica Internacional da Rede Académica das Ciências da Saúde da Lusofonia*, 5(Sup), 29-30.
<https://doi.org/10.51126/revsalus.v5iSup.538>
- Pereira, S. G., Verdugo, J., & Fonseca-Pinto, R. (2022, May). Rapid Antimicrobial Susceptibility Testing Using Laser Speckle Technology. In 2022 45th Jubilee International Convention on Information, Communication and Electronic Technology (MIPRO) (pp. 389-392). IEEE.
[10.23919/MIPRO55190.2022.9803789](https://doi.org/10.23919/MIPRO55190.2022.9803789)
- Fonseca-Pinto, R., Ferreira, F., Alves, J., Januário, F., & Antunes, A. (2022, May). Impact of the COVID-19 Pandemic on Adherence to Exercise Prescription: The case of Cardiac Rehabilitation Programs. In 2022 45th Jubilee International Convention on Information, Communication and Electronic Technology (MIPRO) (pp. 374-377). IEEE.
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- Pereira, P. M., Thomaz, L. A., Tavora, L. M., Assuncao, P. A., Fonseca-Pinto, R., Paiva, R. P., & Faria, S. M. (2021, November). Skin lesion classification using features of 3D border lines. In 2021 43rd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC) (pp. 2726-2731). IEEE.
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- Pereira, P. M., Thomaz, L. A., Tavora, L. M., Assuncao, P. A., Fonseca-Pinto, R., Paiva, R. P., & Faria, S. M. (2021, February). Skin lesion classification using bag-of-3D-features. In 2021 Telecoms Conference (ConfTELE) (pp. 1-6). IEEE.
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- Filipe, J. N., Assuncao, P. A., Tavora, L. M., Fonseca-Pinto, R., Thomaz, L. A., & Faria, S. M. (2021, January). Improved patch-based view rendering for focused plenoptic cameras with extended depth-of-field. In 2020 28th European Signal Processing Conference (EUSIPCO) (pp. 680-684). IEEE.
[10.23919/Eusipco47968.2020.9287562](https://doi.org/10.23919/Eusipco47968.2020.9287562)
- Cunha, F., Thomaz, L. A., Tavora, L. M., Assunção, P. A., Fonseca-Pinto, R., & Faria, S. M. (2020, October). Robust depth estimation from multi-focus plenoptic images. In 2020 IEEE International Conference on Image Processing (ICIP) (pp. 2626-2630). IEEE.
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- Fonseca-Pinto, R., Silva, E., Martinho, R., Rijo, R., Januário, F., & Antunes, A. (2020, September). MOVIDA. eros: an eHealth Solution for Cardiac Rehabilitation Programs. In 2020 43rd International Convention on Information, Communication and Electronic Technology (MIPRO) (pp. 361-364). IEEE.
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- Fonseca-Pinto, R., Lopes, N. V., Brito, G. C., Lages, M., & Guarino, M. P. (2020). Assessing autonomic control of metabolic syndrome by principal component analysis: a data driven methodology. *Health and Technology*, 10, 79-85.
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- Lourenco, R., Assuncao, P., Tavera, L., Thomaz, L. A., Pinto, R., & Faria, S. (2019, June). Edge reconstruction method to improve depth estimation from light fields. In EURASIP European Light Field Imaging Workshop ELFI.
- 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. [http://dx.doi.org/doi: 10.1159/000497797](http://dx.doi.org/doi:10.1159/000497797)
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- 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. <http://dx.doi.org/10.1109/ENBENG.2019.8692447>
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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. <http://dx.doi.org/10.23919/MIPRO.2019.8756855>

- 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>
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- 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.
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Projetos de Investigação

1. 2ARTs – Accessing Autonomic Control I n Cardiac Rechbilitaion

- **Papel:** Investigador Principal
- **Referência:** FCT – PDTC/EMD-EMD/5688/2020;
- **Financiamento:** 239 304 Euros.
- **Período de Execução:** 2020- 2024

Resumo: Cardiac rehabilitation (CR) is a multidisciplinary process for patients recovering after an acute cardiac event or with chronic cardiovascular disease that reduces mortality and morbidity and improves quality of life.

The main goal of 2ART project is to propose a CR program focused on the assessment of the Autonomic Nervous System (ANS), based on the evidence provided by intelligent methodologies of data analysis and Machine Learning. The obtained model is intended to account for the effect of the intervention and to be adapted to individual suitability.

2. 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;

3. 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;

4. 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.

5. 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;

6. 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,...).

7. 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 e Matemática II
 - Análise Matemática e Matemática Aplicada
 - Física, Mecânica e Biofísica
- **Curso de Licenciatura em Tecnologia dos Equipamentos de Saúde**
 - Sistemas de Imagiologia
 - Física Geral
- **Cursos de Especialização Tecnológica (CET) e Cursos Técnicos Superiores Profissionais (CTeSP)**
 - Fundamentos de Matemática
- **Pós Graduação em Terapia da Mão e Mestrado em Terapia da Mão**
 - Anatomia Funcional e Biomecânica
 - Imagiologia
 - Condições clínicas do Membro Superior
- **Curso de Licenciatura em Terapia Ocupacional**
 - Biomecânica e Movimento Humano
 - Anatomia
 - Fisiologia e Biologia de Esforço
 - Doença, Avaliação e Diagnóstico
- **Curso de Licenciatura em Fisioterapia**
 - Biofísica
 - Cinesiologia e Biomecânica
- **Curso de Licenciatura em Ciências da Informação em Saúde**
 - Tecnologias de Diagnóstico e Imagiologia Médica
- **Curso de Mestrado em Prescrição do Exercício (ESECS) e Mestrado em Design para a Saúde e Bem estar (ESAD.cr)**
 - Metodologia de Investigação
 - Sistemas e Sinais Neurobiológicos

Outras atividades

- Membro fundador da equipa do projeto CienciaLIZar (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)

