Diogo **Branco**

PhD Student/Researcher

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Summary

Diogo Branco received his B.Sc and M.Sc degrees in Clinical and Health Psychology from Portucalence University (UPT, Portugal) in 2016 and 2018, respectively. He is currently pursuing a Ph.D. in Informatics Engineering at Madeira University, Portugal. His research lies at the intersection of affective computing, neuroscience, and machine learning, with a strong focus on applications in healthcare. At the core of his work is the development of Virtual Reality frameworks with affective computing techniques. By leveraging machine learning algorithms, his research aims to enhance emotion recognition and cognitive state monitoring, ultimately contributing to the creation of intelligent, adaptive tools for clinical assessment, mental health intervention, and neurofeedback therapies.

Skills

Programming	C#, R, Python, Java, LaTeX
Statistical Data Analysis	SPSS, R Studio, Python (Pandas, Scipy, Matplotlib)
Psychology Specific Software	E-PRIME, OpenSesame, PsychoPy
Tools & Frameworks	Unity 3D, Pytorch, Tensorflow, Sklearn, Processing, Adobe Photoshop, Reaper
Languages	English, Portuguese

Experience

PCGRL, University of Malta/Institute of Digital Games (IDG)
Funchal, Portugal

ERASMUS VISITOR
October 2023 - November 2023

- Funded by the Project "Consortium Advanced Computing - HPC, HPDA, AI & HPV" (2021-1-PT01-KA131-HED-000008876) under the Erasmus + Program, Education and Training 2021 - Higher Education - Action KA131 - Mobility for Learning Purposes.
- Training on Procedural Content Generation using Reinforcement Learning controlled for affective content under the supervision of Professor Ahmed Khalifa, PhD
  - Barthet, M., **Branco**, D., Gallotta, R., Khalifa, A., & Yannakakis, G. N. (2024). Closing the Affective Loop via Experience-Driven Reinforcement Learning Designers. In: 12th International Conference on Affective Computing & Intelligent Interaction, Glasgow, UK. doi: 10.1109/ACII63134.2024.00034

EcoVR Framework, University of Madeira/Madeira N-LINCS/NeuroRehabLab
Funchal, Portugal

PHD STUDENT
April 2022 - Ongoing

- PhD Project "EcoVR Framework" funded by Fundação para a Ciência e Tecnologia
- Standardized Emotion Elicitation Databases
- Computer Vision mining of stimuli used for Emotion Elicitation
- Construction of VR affective scenarios using affect as metric.
- Affective scenarios generation.

NeuroAugVR, NeuroRehabLab
Funchal, Portugal

COLABORATOR
April 2021 - 2023

- Project "NeuroAugVR – Stroke Neurorehabilitation Augmented by Virtual Reality and EEG-neurofeedback: Neuroimaging-based Validation and Optimization" funded by Fundação para a Ciência e Tecnologia
- Actitivies:
  - Electroencephalography data collection
  - Project technical troubleshooting

Neurocobots: Enhancing Human-Robot Collaboration, NeuroRehabLab & ProActionLab
Funchal, Portugal

COLABORATOR/PROGRAMMER
April 2021 - Ongoing

- Project supported partial by BIAL
- Actitivies:
  - Development of interaction scenarios between cobots and humans in Virtual Reality using Unity Game Engine
  - Dissemination of project reports.
  - Dissemination of scientific articles.

BRaNT, Madeira Interactive Technology Institute| ARDITI | NOVA LINCS| University of Madeira

Funchal, Portugal

RESEACH ASSISTANT/PROGRAMMER

May 2020 - Nov 2022

- Project "Belief Revision applied to Neurorehabilitation Therapy (BRaNT) funded by Fundação para a Ciência e Tecnologia
- Activities:
    - Development of Serious Games using Unity Game Engine
    - Creation of the assets for in game usage.
    - Dissemination of project reports.
    - Dissemination of scientific articles.

tDCS as add-on treatment to CBT in patients with OCD: a phase II randomised clinical trial, University Of Minho CIPSI

Braga, Portugal

RESEACH ASSISTANT

May 2019 - May 2020

- Project "Transcranial Direct Current Stimulation (tDCS) as add-on treatment to Cognitive-Behavior Therapy in patients with Obsessive-Compulsive Disorder: a phase II randomised clinical trial" funded by Fundação para a Ciência e Tecnologia
- Activities:
    - tDCS practice
    - Data collection using electrophysiology (heart rate, skin conductance level, respiratory and electroencephalography)
    - Programming experiments using E-PRIME and Python Language
    - Dissemination of scientific articles.

Increasing the effectiveness of transcranial electrical stimulation: Development of a closed loop system., University Of Minho CIPSI

Braga, Portugal

RESEACH ASSISTANT

2018 - 2019

- Project "Increasing the effectiveness of transcranial electrical stimulation: Development of a closed loop system." funded by Fundação para a Ciência e Tecnologia
- Activities:
    - Data collection using electrophysiology (heart rate, skin conductance level, respiratory and electroencephalography)
    - Programming experiments using E-PRIME and Python Language

Invites

GUEST LECTURES

Research Methods I and II

University Portucalense, Porto

LECTURE

2014

- Assistance to Professor Manuela D'Oliveira PhD for SPSS practical lessons.

Emotion Laboratory Course I

University of Minho, Braga

LECTURE

2020

- Multiple lessons with topics such as emotion processing from the physiological point of view. Invited by Professor Óscar Gonçalves, PhD.

CONFERENCES

6.º Congresso da Ordem dos Psicólogos Portugueses

Lisbon, Portugal

INVITED SPEAKER

2024

- Technology, Mind & Society, American Psychological Association (APA) Conference, integrated into the 6th Congress of the Portuguese Psychologists' Association (2024).
    - Speaker in the debate "New Technologies, Neuroscience, and Neurodiversity."

Supervision

2024	**Paulo Fernandes**, Supervisor at the internship site (NeuroRehabLab,ARDITI) for the Master's in Clinical Psychology, Health, and Well-being at the University of Madeira	*University of Madeira*
2024	**Pedro Lobo**, "A Dynamic Difficulty Adjustment Framework for Serious Games Applications in Neurorehabilitation", Master Thesis co-supervision with Sergi Bermúdez I Badia	*University of Madeira*
2021	**Ivan Teixeira**, "Reh@Store: an ecosystem for the management, deployment and update of serious games and virtual environments for health", Master Thesis co-supervision with Sergi Bermúdez I Badia	*University of Madeira*

Honors & Awards

2024	**Scholarship**, Scholarship for International Summer School on AI and Games 2024 by Keyword Studios	*Valletta, Malta*
2021	**Scholarship**, PhD. scholarship by Fundação para a Ciência e a Tecnologia with reference 2021.05646.BD	
2019	**Winner**, First Place Winner at BR41N.IO DESIGNERS' HACKATHON AT BRAINSTORMS FESTIVAL VIENNA	*Vienna, Austria*
2019	**Waiver**, Fee waiver granted for PracticalMEEG ICM 2019 at Hôpital Pitié-Salpêtrière Département de Neuropathologie	*Paris, France*

Publications

JOURNAL PUBLICATIONS

Faria, A. L., Almeida, Y., **Branco**, D., Câmara, J., Cameirão, M., Ferreira, L., Moreira, A., Paulino, T., Rodrigues, P., Spinola, M., et al. "NeuroAIreh@b: an artificial intelligence-based methodology for personalized and adaptive neurorehabilitation". In: *Frontiers in Neurology* 14 (2024), p. 1258323.

Branco, D., Gonçalves, Ó. F., and Badia, S. B. i. "A Systematic Review of International Affective Picture System (IAPS) around the World". In: *Sensors* 23.8 (2023). ISSN: 1424-8220. DOI: 10.3390/s23083866. URL: https://www.mdpi.com/1424-8220/23/8/3866.

Badia, S. B. i., Silva, P. A., **Branco**, D., Pinto, A., Carvalho, C., Menezes, P., Almeida, J., and Pilacinski, A. "Virtual Reality for Safe Testing and Development in Collaborative Robotics: Challenges and Perspectives". en. In: *Electronics* 11.11 (2022), p. 1726. ISSN: 2079-9292. DOI: 10.3390/electronics11111726. URL: https://www.mdpi.com/2079-9292/11/11/1726 (visited on 01/24/2023).

Dias da Silva, M., Gonçalves, Ó., **Branco**, D., and Postma, M. "Revisiting consciousness: Distinguishing between states of conscious focused attention and mind wandering with EEG". en. In: *Consciousness and Cognition* 101 (2022), p. 103332. ISSN: 10538100. DOI: 10.1016/j.concog.2022.103332. URL: https://linkinghub.elsevier.com/retrieve/pii/S1053810022000642 (visited on 01/24/2023).

Palhares, P. T., **Branco**, D., and Gonçalves, Ó. F. "Mind wandering and musical creativity in jazz improvisation". en. In: *Psychology of Music* 50.4 (2022), pp. 1212–1224. ISSN: 0305-7356, 1741-3087. DOI: 10.1177/03057356211033346. URL: http://journals.sagepub.com/doi/10.1177/03057356211033346 (visited on 01/24/2023).

Gonçalves, Ó. F., Dias da Silva, M. R., Carvalho, S., Coelho, P., Lema, A., Mendes, A. J., **Branco**, D., Collus, J., Boggio, P. S., and Leite, J. "Mind wandering: Tracking perceptual decoupling, mental improvisation, and mental navigation." en. In: *Psychology & Neuroscience* 13.4 (2020), pp. 493–502. ISSN: 1983-3288, 1984-3054. DOI: 10.1037/pne0000237. URL: http://doi.apa.org/getdoi.cfm?doi=10.1037/pne0000237 (visited on 01/24/2023).

BOOK CHAPTERS

Dias da Silva, M. R., Faber, M., Andrade **Branco**, D. A. de, and Postma, M. "Mind and Body: The Manifestation of Mind Wandering in Bodily Behaviors". en. In: *New Perspectives on Mind-Wandering*. Springer International Publishing, 2022, pp. 59–75. ISBN: 978-3-031-06954-3 978-3-031-06955-0. DOI: 10.1007/978-3-031-06955-0_4. URL: https://link.springer.com/10.1007/978-3-031-06955-0_4 (visited on 01/24/2023).

FULL CONFERENCE PUBLICATIONS

Barthet, M., **Branco**, D., Gallotta, R., Khalifa, A., and Yannakakis, G. N. " Closing the Affective Loop via Experience-Driven Reinforcement Learning Designers ". In: *2024 12th International Conference on Affective Computing and Intelligent Interaction (ACII)*. IEEE Computer Society, 2024, pp. 257–265. DOI: 10.1109/ACII63134.2024.00034.

Branco, D., Pereira, A. H., Sardinha, L., Cameirão, M. S., Badia, S. B. i, and Faria, A. L. "Immersive Exergaming: Harnessing Virtual Reality Head-Mounted Displays for Health and Fitness Enhancement Through Case Study". In: *2024 IEEE 12th International Conference on Serious Games and Applications for Health (SeGAH)*. IEEE. 2024, pp. 1–8.

Lobo, P., Lima, R., **Branco**, D., and Badia, S. B. i. "Flow optimizer: A dynamic difficulty adjustment framework for serious games in neurorehabilitation". In: *2024 IEEE 12th International Conference on Serious Games and Applications for Health (SeGAH)*. IEEE. 2024, pp. 1–8.

Teixeira, I., **Branco**, D., and Badia, S. B. I. "Reh@ Store: An Open-Source Framework for Enhancing ICT-Based Health Interventions with Secure Distribution, Maintenance, and Data Collection". In: *Procedia Computer Science* 239 (2024), pp. 1524–1531.

Câmara, J., Paulino, T., Spínola, M., **Branco**, D., Cameirão, M., Faria, A. L., Ferreira, L., Moreira, A., Silva, A. R., Vilar, M., Simões, M., Bermúdez i Badia, S., and Fermé, E. "COGNITIVE TRAINING FOLLOWING STROKE: A PILOT STUDY WITH THE NEUROAIREH@B PLATFORM". pt. In: *Psicologia, Saúde & Doença* 23.2 (2022), pp. 374–381. ISSN: 21828407. DOI: 10.15309/22psd230203. URL: https://www.sp-ps.pt/downloads/download_jornal/904 (visited on 01/24/2023).

Paulino, T., Câmara, J., Branco, D., Ferreira, L., Spínola, M., Faria, A., Bermudez, S., and Fermé, E. "Usability Evaluation of Cognitive Training with the NeuroAIreh@b Platform: Preliminary Results of an Ongoing Pilot Study". In: *14th International Conference on Disability, Virtual Reality Associated Technologies (ICDVRAT 2022)* (2022).

Branco, D., Silva, P. A., Almeida, J., Menezes, P., Badia, S. B. I., and Pilacinski, A. "Virtual Reality, a tool for safe testing of user experience in collaborative robotics". In: 2021. DOI: 10.14236/ewic/HCI2021-W2.4. URL: `https://scienceopen.com/hosted-document?doi=10.14236/ewic/HCI2021-W2.4` (visited on 01/24/2023).

Spínola, M., Câmara, J., Faria, A. L., Paulino, T., **Branco**, D., Cameirão, M., Bermúdez i Badia, S., and Fermé, E. "A step towards the design of an ADL-based cognitive training platform: enhancing the ecological validity". In: 2021. DOI: 10.34944/dspace/7297.

Carvalho, S., Gonçalves, Ó., Faria, S., Coelho, P., **Branco**, D., and Leite, J. "Cross-hemispheric tDCS over the temporal lobe affects the consolidation of previous learning in healthy volunteers." In: *Psicologia* 43 (2020), pp. 425–430.

Leite, J., Gonçalves, Ó., Silva, S., **Branco**, D., Coelho, P., and Carvalho, S. "Cross-hemispheric transcranial Direct Current Stimulation over the parietal cortex impairs task switching performance". In: *Psicologia* 43 (2020). International Neuromodulation Society, Sydney, Austrália, 2019, pp. 425–430.

Conferences Presentations and Workshops

Câmara, J., Paulino, T., Spínola, M., **Branco**, D., Cameirão, M. S., Faria, A. L., Ferreira, L., Silva, A. R. E. S., Vilar, M., Badia, S. B. I., and Fermé, E. "Cognitive training involving simulations of instrumental activities of daily living: a pilot study with the NeuroAIreh@b platform". In: (2022). 14th International Conference on Disability, Virtual Reality Associated Technologies. URL: `https://rgdoi.net/10.13140/RG.2.2.25426.84168` (visited on 01/24/2023).

Branco, D. "BRANT- BELIEF REVISION APPLIED TO NEUROREHABILITATION THERAPY: Combining AI modules, gamification and remote monitoring capabilities to enable Health Professionals to provide long-term personalized cognitive rehabilitation therapy at home." In: (2021). 1st International Conference on Immersive Technology (Virtual reality, augmented, virtual, mixed reality, and AI) 2020. https://www.xr-col.nl/ Tilburg University (Tilburg, Países Baixos). URL: `https://rgdoi.net/10.13140/RG.2.2.25426.84168` (visited on 01/24/2023).

Branco, D. "Desenvolvimento de avaliações e intervenções neuropsicológicas com validade ecológica através de tecnologias baseadas em realidade virtual". In: (2021). 14º CONGRESSO NACIONAL PSICOLOGIA DA SAÚDE PSICOLOGIA E SAÚDE EM TEMPOS DE CRISE (Madeira,Portugal). (Visited on 01/24/2023).

Palhares, P., **Branco**, D., and Gonçalves. "Mind wandering and musical creativity in expert jazz improvisation." In: (2021). XV National Meeting da APPE (Portuguese Association of Experimental Psychology) Portuguese Association of Experimental Psychology (Lisbon, Portugal. URL: `https://rgdoi.net/10.13140/RG.2.2.25426.84168` (visited on 01/24/2023).

Posters

Câmara, J., Paulino, T., Spínola, M., **Branco**, D., Cameirão, M. S., Faria, A. L., Ferreira, L., Silva, A. R. E. S., Vilar, M., Badia, S. B. I., and Fermé, E. "Cognitive training involving simulations of instrumental activities of daily living: a pilot study with the NeuroAIreh@b platform". In: (2022). 14th International Conference on Disability, Virtual Reality Associated Technologies. URL: `https://rgdoi.net/10.13140/RG.2.2.25426.84168` (visited on 01/24/2023).

Câmara, J., Spínola, M., Paulino, T., **Branco**, D., Cameirão, M. S., Faria, A. L., Ferreira, L., Moreira, A., Vilar, M., Simões, M. R., Badia, S. B. I., and Fermé, E. "Computerized cognitive training based on ADLs in the chronic phase of stroke: a case study with the NeuroAIreh@b". en. In: (2022). Congreso Internacional Neurorrehabilitación del daño cerebral. DOI: 10.13140/RG.2.2.18715.95523. URL: `https://rgdoi.net/10.13140/RG.2.2.18715.95523` (visited on 01/24/2023).

Paulino, T., Câmara, J., Spínola, M., **Branco**, D., Faria, A. L., Gonçalves, L., and Cameirão, M. "NeuroAIReh@b: Participatory and multidisciplinary design of a tablet-based platform for cognitive training". In: (2022). RehabWeek 2022,Rotterdam, The Netherlands. DOI: `http://dx.doi.org/10.13140/RG.2.2.17740.49284`.

Gonçalves, Ó., Carvalho, S., Lema, A., Mendes, A., **Branco**, D., Collus, J., Coelho, P., and Leite, J. "Shifting the balance between hemispheres or single hemisphere stimulation for response inhibition." In: (2019). International Neuromodulation Society, Sydney, Austrália, 2019. URL: `https://www.researchgate.net/publication/353951594_Shifting_the_balance_between_hemispheres_or_single_hemisphere_stimulation_for_response_inhibition`.

Gonçalves, Ó., Leite, J., Lema, A., Mendes, A., **Branco**, D., Collus, J., Coelho, P., and Carvalho, S. "Combining Cognitive Modification Bias Intervention With Transcranial Direct Current Stimulation Increases Craving For Food". In: (2019). International Neuromodulation Society, Sydney, Austrália, 2019. URL: `https://www.researchgate.net/publication/353953083_Combining_Cognitive_Modification_Bias_Intervention_With_Transcranial_Direct_Current_Stimulation_Increases_Craving_For_Food`.

Thesis

Branco, D. *Emotional Movie Database (EMDB): From Concept to Impact and Future Directions*. Universidade Portucalense. 2018. DOI: `http://hdl.handle.net/11328/2572`.