Curriculum Vitae

Last update: Sept. 1st, 2021

Antonio Henrique de Oliveira Fonseca

Email: antonio.fonseca@yale.edu
Phone: +(203)691-0675

Education

Yale University – New Haven CT, USA 08/2019 – Current
Ph.D. in Neuroscience
Awarded by the CAPES-Yale Graduate Scholars Program for the full extension of the PhD program

Federal University of Rio Grande do Sul – RS, Brazil 03/2017 – 06/2019
M.Sc. Microelectronics
Awarded a Master Sandwich Fellowship from CAPES for two years at Yale University to receive training in behavioral neurosciences (July 2017 – June 2019)

Laurentian University, ON 09/2012 – 12/2013
Mechanical Engineering (undergraduate Sandwich program)
Awarded a Science Without Borders Scholarship

Federal University of ABC, Santo André – SP, Brazil 01/2009 – 09/2015
Bachelor of Automation, Instrumentation and Robotic Engineering

Federal University of ABC, Santo André – SP, Brazil 01/2009 – 09/2012
Bachelor of Science and Technology

Honors and Awards

2021	Invited speaker, Geospatial Summer School 2021 - Stockholm, Sweden
2020	Neurohackademy - workshop grant
2019	CAPES-Yale Graduate Scholars Program (3 years)
2019	Invited speaker, Università degli Studi di Siena - Siena, Italy
2019	Invited speaker, Geospatial Summer School 2019, Matera - Basilicata, Italy
2019	Janelia's Junior Scientist Workshop - Travel grant
2017	General Program of International Cooperation Scholarship, CAPES (2 years)
2014	Head Instructor Award for exceptional performance during classes, Laurentian University.

2012-2013 Science Without Borders Scholarship, Brazil/Canada.

2012 Work selected for short talk presentation, 8th Computer Vision Workshop, Federal University of Goiás, Goiânia – GO, Brazil.

2011-2012 São Paulo Research Foundation Scholarship.

2010-2011 Brazilian National Council for Scientific and Technological Development Scholarship.

2009 Best paper presented at the VI Symposium on Experimental Basis of Natural Sciences, Federal University of ABC, Santo André – SP, Brazil.

Research Experience

Project: Modelling the dynamics in mesoscopic imaging with transformers (2020 - Current)

Local: Yale University - USA

Activities: Ph.D. Student

Knowledge acquired: Signal processing, Neural ODEs, Mesoscopic imaging, Transformer models, Python-Matlab integration.

Project: Learning embedded representations of zebrafish vasculature via contrastive learning (2020 - Current)

Local: Yale University - USA

Activities: Ph.D. Student

Knowledge acquired: Contrastive learning networks, Distillation learning, 3D imaging

Project: Fully Automated Tool for Mice Vocalization Processing (2016 - 2019)

Local: Yale University - USA and Federal University of Rio Grande do Sul - Brazil

Activities: M.Sc. Student

Knowledge acquired: Animal behavior; Animal handling and care for experimental purposes; Signal processing; Statistical clustering methods; Machine learning; High-performance computing.

Project: Tracking Mice in Large Environments for Social Behavior Analysis *(*2016 - 2019)

Local: Yale University - USA and Federal University of Rio Grande do Sul - Brazil

Activities: M.Sc. Student

Knowledge acquired: Embedded systems based on Raspberry Pi; Probabilistic networks; Distributed computation; Analysis in clusters.

Project: Automated Rearing Device for Infant Mice – *MamaBot* (2017)

Local: Yale University - USA

Activities: Post-graduate associate (visiting Master Student); supervised Yale College undergraduate summer student.

Knowledge acquired: Embedded systems based on Arduino; Stand-alone devices; Biological features of mother-offspring relation; Analogue electronics.

Project: Monocular Robotics Computer Vision in Android Applied to Object Interception (2014 - 2015)

Local: Federal University of ABC - Brazil

Activities: Researcher

Knowledge acquired: Development of Android apps; Embedded systems; Real-time processing in mobile; Real-time communication in mobile.

Project: Dozens Simultaneous Tracking of Objects (2011 - 2015)

Local: Federal University of ABC/ University of São Paulo

Funding: FAPESP (São Paulo Research Foundation) / CNPq (National Council for Scientific and Technological Development).

Activities: Researcher

Knowledge acquired: C/CUDA programming language; Parallel processing theory; Image processing (target identification in images with noise).

Project: Design and implementation of a distance measurement algorithm in Matlab Simulink environment based on previous works performed in robotics lab for indoor and outdoor visual tracking of a moving object in unstructured environment using single camera (2013).

Local: Laurentian University, Ontario, Canada

Activities: Programmer in MATLAB / Simulink e CAD Designer

Knowledge acquired: LMS Virtual Lab; SolidWorks; Image processing (target identification in images without stable background) using Simulink tools.

Project: Quantification Visual Automatic Response freezing in mice (2009 – 2011)

Local: Federal University of ABC - Brazil

Funding: CNPq (National Council for Scientific and Technological Development)

Activities: Researcher

Knowledge acquired: MATLAB programming language; Image processing (edge detection and movement quantification in videos); Interface development (theory and implementation in MATLAB).

Industry Experience

Company: Diebold Brazil (Procomp Indústria Eletrônica Ltda.) (2014 – 2016)

Local: São Paulo – SP, Brazil

Activities: Reliability Engineering

Knowledge acquired: Java programming language; Automation and management of testing systems; Software development for test support and monitoring; Hardware debugging.

Company: Penguin Automated Systems Inc. (2013)

Local: Naughton - ON, Canada

Activities: Programmer

Knowledge acquired: C++ programming language; Visual Studio 2012; OpenCV;

Main projects: (1) Development of software for controlling the actuator of a driller robot arm based on image processing. (2) Software development to "stitch" images from several cameras in order to produce a single panoramic image with 360-degree view.

Teaching Experience

Department: Computer Science / Neuroscience - Yale University (2021)

Course: Advanced Computational Vision

Duties: Advising student presentations, grading and guiding discussions

Department: Interdepartmental Neuroscience Program (2020 & 2021)

Course: Data Analysis Boot Camp

Duties: Advising student presentations, teaching basics of Matlab and Github.

Publications and presentations

1) Fonseca, A. H. de O.; Santana, G. M.; Ortiz, G. M. B.; Bampi, S.; Dietrich, M. O. Analysis of ultrasonic vocalizations from mice using computer vision and machine learning. Elife 10 (2021): e59161.

2) Fonseca, A. H. de O., and van Dijk, D. "Learning aligned embeddings for semi-supervised word translation using Maximum Mean Discrepancy." arXiv preprint arXiv:2006.11578 (2020).

3) Zimmer, M. R.; Fonseca, A. H. de O.; Dai Pra, R.; Dietrich, M. O. Functional ontogeny of hypothalamic Agrp neurons in neonatal mouse behaviors." Cell 178.1 (2019): 44-59.

4) Fonseca, A. H. de O.; Ortiz, G. B.; Dietrich, M. O. Infant Vocalization in Mice Assessed by Machine Learning. Poster presented at the Neuroscience Track Reception Meeting 2018, Yale University – USA, 2018.

5) Fonseca, A. H. de O.; Zimmer, M. R; Dietrich, M. O. Fully automated tool for mice vocalization detection and classification. Poster presented at the Neuroscience Retreat 2017, Yale University – USA, 2017.

6) Fonseca, A. H. de O.; Zimmer, M. R; Dietrich, M. O. Fully automated tool for vocalization detection. Poster presented at the NeuroDay 2016, Yale University – USA, 2016.

7) Fonseca, A. H. de O.; Zana, Y. Automated visual insect tracking for statistical measurements. Poster Presented at the Third Brazilian Meeting on Brain and Cognition, Federal University of ABC, São Bernardo do Campo – SP, Brazil 2015. Article published in annals of event (complete).

8) Fonseca, A. H. de O.; Zana, Y. A New System for Automated Visual Tracking of Termites. Poster presented in the National Congress of Applied and Computational Mathematics, Natal – RN, Brazil. 2014.

9) Fonseca, A. H. de O.; Toledo, M. A.; Helena, A. F.; Zana, Y. Simultaneous tracking of dozens of objects. Talk presented in the VIII Computational Vision Workshop, Goiânia – GO, Brazil. 2012. Article published in annals of event (complete)

10) Fonseca, A. H. de O.; Zana, Y. Visual Automatic Quantification of Freezing Response in Rats: Development of a Graphical User Interface. First Brazilian Meeting on Brain and Cognition, 2010, Santo André – SP, Brazil. 2010.

In preparation/review

1) Perrenoud, Q., Fonseca, A. H. de O., Airhart, A., Bonanno, J., Mao, R., Cardin, J. A. Pulses of gamma activity in mouse V1 predict visually guided behavior. (in preparation)

2) Iyilikci, O., Kim, L., Fonseca, A. H. de O., Bober, J., Santana, G. M., Dietrich Dietrich, M. O. Social rewards inhibit agouti-related peptide expressing neurons during the critical period that extends from preweaning to late adolescence (in revision at Nature)

Press Coverage

A new software for USV analysis (2021):
https://www.nature.com/articles/s41684-021-00766-3

Other Activities

1) Mentor in the Iniciativa Proxima Mentorship Program (https://www.iniciativa-proxima.org/)

2) Member of the Yale Computer Society.

References

1) **Name**: David Van Dijk, PhD.
   Title/Affiliation: Assistant Professor of Medicine, Computer Science and Neuroscience – Yale University, New Haven (CT), USA.
   Email: david.vandijk@yale.edu

2) **Name**: Marcelo de Oliveira Dietrich, MD, PhD.
   Title/Affiliation: Assistant Professor of Comparative Medicine and Neuroscience – Yale University, New Haven (CT), USA.
   Phone: +1 (203) 785-6695
   Email: marcelo.dietrich@yale.edu

3) **Name**: Yossi Zana, PhD.
   Title/Affiliation: Professor of Computer Science and Cognition – Federal University of ABC, Santo André (SP), Brazil.
   Phone: +55 (11) 4996-8337
   Email: yossi.zana@ufabc.edu.br