CURRICULUM VITAE

ANTÔNIO H. RIBEIRO

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EDUCATION

Ph.D., Electrical Engineering *Aug. 2017 - Mar. 2020*
Universidade Federal de Minas Gerais (UFMG)
Title: *Learning nonlinear differentiable models for signals and systems: with applications*
Supervisor: Luis Antonio Aguirre
Co-supervisor: Thomas Schön.
Credits: A total of 23 credits (345 class-hours). Graded point average: 5.0 out of 5.0.
> With one year, from *Sept. 2018 to Sept. 2019*, as a guest doctoral student at **Uppsala University** under the supervision of **Thomas Schön**.

M.Sc., Electrical Engineering *Jan. 2016 - Jul. 2017*
Universidade Federal de Minas Gerais (UFMG)
Title: *Recurrent Structures in System Identification*
Supervisor: Luis Antonio Aguirre
Credits: A total of 25 credits (375 class-hours). Graded point average: 5.0 out of 5.0.

B.S.E., Electrical Engineering *Jan. 2011 - Jan. 2016*
Universidade Federal de Minas Gerais (UFMG)
Credits: A total of 240 credits (3600 class-hours). Graded point average:[1]: 4.91 out of 5.00

ACADEMIC POSITIONS

Postdoctoral Researcher Fev. 2021 - Now
Department of Information Technology, Uppsala University *Sweden*

· I am working under the supervision of Thomas Schön on the intersection of machine learning, signal processing, and control theory.

Postdoctoral Associate Mar. 2020 - Fev. 2021
Department of Computer Science, Universidade Federal de Minas Gerais (UFMG) *Belo Horizonte, Brasil*

· I worked on developing new machine learning algorithms and studying its application to engineering and health care. My position was funded by the Brasilian Agency CAPES, through the institutional internalization program (PRINT).

Undergraduate Researcher Intern Jun. 2013 - Jan. 2015
Research and development project with Petrobras Oil Company, UFMG *Belo Horizonte, Brazil*

· I worked on the development of methods for identification of oil well mathematical models under the supervision of Professor Luis Antonio Aguirre. My position was funded by the Petrobras Oil Company through the *Christiano Ottoni Foundation* (FCO) in the modality *"bolsa de iniciao cientfica"*.

WORK EXPERIENCE

Google Summer of Code May. 2017 - Aug. 2017
Software Developer *Scipy*

· I have successfully completed Google Summer of Code program under the mentorship of Matt Haberland, Nikolay Mayorov and Ralf Gommers. My project was the implementation of an interior-point solver for large-scale nonlinear programming problems. The result is the method `trust-contr`, now openly available as part of the open source scientific library SciPy, in Python.

Invent Vision Jan. 2015 - Dec. 2015
Hardware Team Intern *Belo Horizonte, Brazil*

· I was part of the hardware development team and worked designing FPGA-based cameras. The major project I have worked on while there was the design and implementation of a stereo camera.

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[1]Weighted average of my letter grade ($A = 5.0$; $B = 4.0$; $C = 3.0$; $D = 2.0$; $E = 1.0$; $F = 0.0$). Weighted according to the course number of credits.

PROFESSIONAL MEMBERSHIP

Scipy core team member Since Nov. 2017

· I am one of the 34 SciPy core development team members[2]. SciPy is one of the core scientific libraries in Python and I was invited to the core team for having contributed to optimization and signal processing packages with the implementation of signal filters: `iirnotch`, `iirpeak`; and optimization methods: `trust-exact`, `trust-constr`. My GitHub account: https://github.com/antonior92 contain a complete list of my open-source contributions.

PROFESSIONAL ACTIVITIES

Peer reviewing: journal papers

· *Proceedings of the National Academy of Sciences (PNAS)* (2020), *Automatica* (2020), *IEEE Transactions on Biomedical Engineering* (2020), *IEEE Control Systems Letters (L-CSS)* (2020), *Systems & Control Letters* (2020), *Chaos, Solutions & Fractals* (2020), *CHEST* (2020), *Journal of Electrocardiology* (2020), *Journal of Control, Automation and Electrical Systems* (2015-2018).

Peer reviewing: conference papers

· *19th IFAC Symposium on System Identification* (2021), *Learning for Dynamics and Control (L4DC)* (2021), *European Control Conference (ECC)* (2021), *IEEE Conference on Decision and Control (CDC)* (2020), *The 21st IFAC World Conference* (2020), *The American Control Conference* (2018), *The 12th International Conference on Modelling, Identification and Control* (2017), *The 20th IFAC World Conference* (2017).

Expert assignments

· *ELLIS (European Laboratory for Learning and Intelligent Systems) PhD Program: Recruitment evaluator* (2020)

AWARDS

Best Poster Award 2019
SciLifeLab Science Summit *Uppsala, Sweden*

· We have been awarded the best poster award for the work *"Automatic Diagnosis of Short-Duration 12-Lead ECG using a Deep Convolutional Network"* presented at SciLifeLab Science Summit (Uppsala, 2019).

Travel Award 2018
Machine Learning for Health (ML4H) Workshop at NeurIPS *Montreal, Canada*

· We have been awarded the travel award for the work *"Automatic Diagnosis of Short-Duration 12-Lead ECG using a Deep Convolutional Network"* presented at Machine Learning for Health (ML4H) Workshop at NeurIPS (Motreal, 2019).

SCHOLARSHIPS

Split-site Ph.D. Scholarship 2019
CNPq *Uppsala, Sweden*

· I have been granted a scholarship from the Brasilian Agency CNPq for staying one year of my Ph.D. in Uppsala University, Sweden.

Ph.D. Scholarship 2018-2020
CNPq *Belo Horizonte, Brasil*

· I have been granted a scholarship from the Brasilian Agency CNPq during my doctoral studies .

M.S. Scholarship 2016 - 2017
CAPES *Belo Horizonte, Brasil*

· I have been granted a scholarship from the Brasilian Agency CAPES during my master studies.

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[2]Checked on February 20, 2020

TEACHING

Teaching assistant
Engenharia de Controle (*Control Engineering*)

Universidade Federal de Minas Gerais,
1st semester - 2017

Teaching assistant
Controle Digital (*Digital Control*)

Universidade Federal de Minas Gerais,
2nd semester - 2016

RESEARCH PROJECTS

***Clinical Outcomes in Eletrocardiography* (CODE)**   *2018-Present*
I integrate the CODE group. The group conducts clinical studies and develops artificial intelligence in electrocardiography. The research project is led by the Professor Antonio Luiz Pinho Ribeiro and is funded by the Brasilian Agency CNPq.

Research and Development Petrobras   *2013-2015*
The project "*Desenvolvimento de ferramenta computacional para identificação de modelos matemáticos de poços de produção de petróleo*" (project name in Portuguese), was funded by the Brazilian oil company Petrobras and led by the Professor Luis Antonio Aguirre. This follow-up project focused on the development of tools to easily generate models for an oil well and in the integration of these tools.

Research and Development Petrobras   *2013*
The project "*Desenvolvimento de metodologia para a identificação de modelos matemáticos de poços de produção de petróleo*" (project name in Portuguese), was funded by the Brasilian oil company Petrobras and led by the Professor Luis Antonio Aguirre. The project focused on the development of models for oil well's dynamic behavior.

ADDITIONAL EDUCATION

Mini-course on Nonlinear System Identification   2019
· I took part on the 3 days mincourse on nonlinear system identification to take place on Eindhoven University of Technology.

Probabilistic Graphical Models Specialization   2018
Coursera   *Stanford*
· I have successfully completed the 3 online courses about probabilistic graphical models offered by *Stanford*: "*Representation*", "*Inference*", "*Learning*".

Deep Learning Specialization   2018
Coursera   *deeplearning.ai*
· I have successfully completed the 5 online courses about deep learning offered in Coursera: "*Neural Networks and Deep Learning*", "*Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization*", "*Structuring Mechine Learning Projects*", "*Convolutional Neural Networks*", "*Sequence Models*".

LANGUAGE CERTIFICATES

Certificate in Advanced English (Council of Europe Level C1)   *Cambridge English Language Assessment, 2014*

OTHER LINKS

Lattes CV (0898576944135254)   lattes.cnpq.br/0898576944135254

ORCID (0000-0003-3632-8529)   orcid.org/0000-0003-3632-8529

SCOPUS (57191699148)   www.scopus.com/authid/detail.uri?authorId=57191699148

Google Scholar (Antonio H. Ribeiro)   scholar.google.com.br/citations?user=5t_sZdMAAAAJ

Web of Science ResearcherID (AAE-1948-2019)   publons.com/researcher/1170361

PUBLICATIONS

Work in Progress

E. M. Lima, A. H. Ribeiro, G. M. Paixão, M. H. Ribeiro, M. M. P. Filho, P. R. Gomes, D. M. Oliveira, E. C. Sabino, B. B. Duncan, L. Giatti, S. M. Barreto, W. Meira, T. B. Schön, and A. L. P. Ribeiro, "Deep neural network estimated electrocardiographic-age as a mortality predictor," *medRxiv*, Feb. 2021. DOI: 10.1101/2021.02.19.21251232.

In Press

J. N. Hendriks, F. K. Gustafsson, A. H. Ribeiro, A. G. Wills, and T. B. Schön, "Deep Energy-Based NARX Models," *To appear in the Proceedings of the 19th IFAC Symposium on System Identification (SYSID)*, 2021. arXiv: 2012.04136.

A. H. Ribeiro, J. N. Hendriks, A. G. Wills, and T. B. Schön, "Beyond Occam's Razor in System Identification: Double-Descent when Modeling Dynamics," in *To Appear in the Proceedings of the 19th IFAC Symposium on System Identification (SYSID)*, 2021. arXiv: 2012.06341.

A. H. Ribeiro and T. B. Schon, "How convolutional neural networks deal with aliasing," in *Accepted at the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2021.

Journal Papers

W. Meira Jr, A. L. P. Ribeiro, D. M. Oliveira, and A. H. Ribeiro, "Contextualized Interpretable Machine Learning for Medical Diagnosis," *Communications of the ACM*, 2020. DOI: 10.1145/3416965.

G. M. M. Paixão, L. G. S. Silva, P. R. Gomes, E. M. Lima, M. P. F. Ferreira, D. M. Oliveira, M. H. Ribeiro, A. H. Ribeiro, J. S. Nascimento, J. A. Canazart, L. B. Ribeiro, E. J. Benjamin, P. W. Macfarlane, M. S. Marcolino, and A. L. Ribeiro, "Evaluation of Mortality in Atrial Fibrillation: Clinical Outcomes in Digital Electrocardiography (CODE) Study," *Global Heart*, vol. 15, no. 1, p. 48, Jul. 2020, ISSN: 2211-8179. DOI: 10.5334/gh.772.

A. H. Ribeiro, M. H. Ribeiro, G. M. M. Paixão, D. M. Oliveira, P. R. Gomes, J. A. Canazart, M. P. S. Ferreira, C. R. Andersson, P. W. Macfarlane, W. Meira Jr., T. B. Schön, and A. L. P. Ribeiro, "Automatic diagnosis of the 12-lead ECG using a deep neural network," *Nature Communications*, vol. 11, no. 1, p. 1760, 2020. DOI: 10/drkd. arXiv: 1904.01949.

A. H. Ribeiro, K. Tiels, J. Umenberger, T. B. Schön, and L. A. Aguirre, "On the smoothness of nonlinear system identification," *Automatica*, vol. 121, p. 109 158, Nov. 2020. DOI: 10.1016/j.automatica.2020.109158. arXiv: 1905.00820.

P. Virtanen, R. Gommers, T. E. Oliphant, M. Haberland, T. Reddy, D. Cournapeau, E. Burovski, P. Peterson, W. Weckesser, J. Bright, S. J. van der Walt, M. Brett, J. Wilson, K. J. Millman, N. Mayorov, A. R. J. Nelson, E. Jones, R. Kern, E. Larson, C. J. Carey, İ. Polat, Y. Feng, E. W. Moore, J. VanderPlas, D. Laxalde, J. Perktold, R. Cimrman, I. Henriksen, E. A. Quintero, C. R. Harris, A. M. Archibald, A. H. Ribeiro, F. Pedregosa, P. van Mulbregt, and S. 1. Contributors, "SciPy 1.0–Fundamental Algorithms for Scientific Computing in Python," *Nature Methods*, vol. 17, no. 3, pp. 261–272, 2020. DOI: 10/ggj45f. arXiv: 1907.10121.

G. M. M. Paixão, E. M. Lima, P. R. Gomes, M. P. Ferreira, D. M. Oliveira, M. H. Ribeiro, A. H. Ribeiro, J. Nascimento, J. A. Canazart, G. Cardoso, L. B. Ribeiro, and A. L. P. Ribeiro, "Evaluation of mortality in bundle branch block patients from an electronic cohort: Clinical Outcomes in Digital Electrocardiography (CODE) study," *Journal of Electrocardiology*, Sep. 2019, ISSN: 0022-0736. DOI: 10/dcgk.

A. H. Ribeiro and L. A. Aguirre, "''Parallel Training Considered Harmful?": Comparing series-parallel and parallel feedforward network training," *Neurocomputing*, vol. 316, pp. 222–231, Nov. 2018, ISSN: 0925-2312. DOI: 10/gfhwnk.

International Conference Papers

D. M. Oliveira, A. H. Ribeiro, J. A. O. Pedrosa, G. M. Paixao, A. L. P. Ribeiro, and W. Meira Jr, "Explaining end-to-end ECG automated diagnosis using contextual features," in *Machine Learning and Knowledge Discovery in Databases. European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD)*, ser. Lecture Notes in Computer Science}, vol. 12461, Ghent, Belgium: Springer, Sep. 2020, pp. 204–219. DOI: 10.1007/978-3-030-67670-4_13.

A. H. Ribeiro, K. Tiels, L. A. Aguirre, and T. B. Schön, "Beyond exploding and vanishing gradients: Attractors and smoothness in the analysis of recurrent neural network training," in *Proceedings of the 23rd International Conference on Artificial Intelligence and Statistics (AISTATS), PMLR*, vol. 108, 2020, pp. 2370–2380. arXiv: 1906.08482.

C. Andersson, A. H. Ribeiro, K. Tiels, N. Wahlström, and T. B. Schön, "Deep Convolutional Networks in System Identification," *Proceedings of the 58th IEEE Conference on Decision and Control (CDC)*, pp. 3670–3676, Sep. 2019. DOI: 10.1109/CDC40024.2019.9030219. arXiv: 1909.01730.

A. H. Ribeiro and L. A. Aguirre, "Lasso Regularization Paths for NARMAX Models via Coordinate Descent," in *2018 Annual American Control Conference (ACC)*, Jun. 2018, pp. 5268–5273, ISBN: 2378-5861. DOI: 10/gf7ssz.

A. H. Ribeiro and L. A. Aguirre, "Shooting Methods for Parameter Estimation of Output Error Models," *IFAC-PapersOnLine*, vol. 50, no. 1, pp. 13 998–14 003, Jul. 2017, ISSN: 2405-8963. DOI: 10/gfjwmp.

A. H. Ribeiro and L. A. Aguirre, "Selecting transients automatically for the identification of models for an oil well," *IFAC-PapersOnLine*, vol. 48, no. 6, pp. 154–158, 2015. DOI: 10/gfjwq8.

Workshop papers, conference abstracts and extended abstracts

A. H. Ribeiro and T. B. Schön, "Overparametrized Regression Under L2 Adversarial Attacks," in *Workshop on the Theory of Overparameterized Machine Learning (TOPML)*, Apr. 2021.

D. M. Oliveira, A. H. Ribeiro, J. A. O. Pedrosa, G. M. M. Paixao, A. L. Ribeiro, and W. M. Jr, "Explaining black-box automated electrocardiogram classification to cardiologists," in *2020 Computing in Cardiology (CinC)*, vol. 47, 2020. DOI: 10.22489/CinC.2020.452.

G. M. Paixão, A. H. Ribeiro, E. Lima, B. Seewald, M. H. Ribeiro, D. Oliveira, P. Gomes, N. Castro, W. Meira, T. Schön, and A. L. Ribeiro, "ECG-AGE FROM ARTIFICIAL INTELLIGENCE: A NEW PREDICTOR FOR MORTALITY? THE CODE (CLINICAL OUTCOMES IN DIGITAL ELECTROCARDIOGRAPHY) STUDY," *Journal of the American College of Cardiology*, vol. 75, no. 11 Supplement 1, p. 3672, 2020, ISSN: 0735-1097. DOI: 10.1016/S0735-1097(20)34299-6.

A. H. Ribeiro, D. Gedon, D. M. Teixeira, M. H. Ribeiro, A. L. P. Ribeiro, T. B. Schon, and W. M. Jr, "Automatic 12-lead ECG classification using a convolutional network ensemble," in *2020 Computing in Cardiology (CinC)*, 2020. DOI: 10.22489/CinC.2020.130.

A. H. Ribeiro, M. H. Ribeiro, G. Paixão, D. Oliveira, P. R. Gomes, J. A. Canazart, M. Pifano, W. Meira Jr., T. B. Schön, and A. L. Ribeiro, "Automatic Diagnosis of Short-Duration 12-Lead ECG using a Deep Convolutional Network," *Machine Learning for Health (ML4H) Workshop at NeurIPS*, 2018. arXiv: 1811.12194.

National Conference Papers

A. H. Ribeiro and L. A. Aguirre, "Relaçoes Estáticas de Modelos NARX MISO e sua Representaçao de Hammerstein," in *XX Congresso Brasileiro de Automática*, 2014.