CURRICULUM VITÆ

NICOLAU LEAL WERNECK

Personal Data

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Professional Outline

Electrical engineer specialized in computation, numerical analysis and geometry, and areas such as Computer Vision and Artificial Intelligence.

Seeking to work with research and development. Great aptitude for programming and learning new technologies. Interested in science and multidisciplinarity.

Advocate of free software and standards. User of GNU/Linux for 20+ years, and of computers in general since childhood.

Areas of Interest

Practical	Computer Vision / Parameter estimation / Mobile applications / Information extraction / High-Performance Computing.
Theoretical	Signal Processing / Pattern Recognition / Machine Learning / Probabilistic modeling.

Objectives

Practical	Automate. Connect. Hack. Make. Implement demanding number-processing algorithms. Create useful AI and Machine Learning applications. Develop free software and open standards.
Theoretical	Use physics and geometry. Explore constraints. Reproduce human abilities with computers and robots. Analyze and synthesize natural entities, *e.g.* music, dance, paintings, furniture, cities.

Computer Science Knowledge

Platforms	GNU/Linux systems, specially Debian and Arch.
Programming	*Native:* Julia, C++, Python. *Experienced:* CUDA, Scala, Assembly, Prolog. *Beginner:* Haskell, OCaml, Dash, LISP, Forth, JavaScript.
Libraries	Akka, Numpy, OpenCV, OpenGL, Qt, ALSA.
Programs	Emacs, Inkscape, MongoDB, xmonad, mplayer, Apache.
Miscellaneous	Spark, Hadoop Streaming, GCP, AWS, LaTeX.

Human Language Knowledge

Very Good: Portuguese, English */ Beginner:* Dutch, French, Japanese

Other Knowledge

{Probability,Information,Number,Network} Theory, Optimization, Reinforcement Learning, Cryptography, Cinema, Music, History of art and science, Psycophysics, Do-it-yourself electronics.

Education

2007–2012 Doctorate in Electrical Engineering
Universidade do Estado de São Paulo — USP
720 hours of classes, mean grade 97.5%.
—Developed a monocular vision method to estimate orientation in a Manhattan world environment. It works with distorted images and uses M-estimation, RANSAC and FilterSQP.

2005–2007 Masters in Electrical Engineering
Universidade Estadual de Campinas — UNICAMP
810 hours of classes, mean grade 96.7%.
—Studied the electric guitar, from its signal production and nonlinear dynamics of strings all the way to timbre perception.

1999–2004 Graduation in Electrical Engineering
Universidade Federal de Minas Gerais — UFMG
3,495 hours of classes, mean grade ∼70%.
—Worked at the CEFALA lab with acoustics, speech, Signal Processing, Pattern Recognition and Computer Graphics.

Professional Activities

AutoFill Technologies Vision based vehicle inspection.

Q4/2021– *Position: Signal and Image Processing Expert*
—Camera array calibration with ground pose.
—Stereo based vehicle tracking and reconstruction.
—Keypoint based image analysis pipeline in the cloud.

Accerion Computer vision for mobile robotics.

Q4/2019–Q4/2021 *Position: Senior Robotics Algorithms Engineer*
—Complete camera calibration application, with innovative numerical solutions and user-friendly GUI.
—Improvements to an image keypoint analysis pipeline. Research on descriptors and GPU programming.

TomTom Dutch navigation devices and mapping services company.

Q4/2016–Q4/2019 *Position: Senior Software Engineer*
—Analysis of panorama images for 3D track estimation.
—Lidar analysis with geometric modeling and machine learning.

Osram German electronics corporation specialized in lighting.

Q4/2015–Q4/2016 *Position: Postdoc*
—Developed a technique to extract identifiable artificial visual landmarks from images.
—Modified an existing monocular visual SLAM system to support additional artificial landmarks extracted from images.

Geekie Brazilian ed-tech start-up.

Q4/2012–Q3/2015 *Position: Software Engineer, Intelligence team*
—Led a small team working with Bayesian networks, including structure learning with genetic algorithm.
—Non-linear regression software for Item Response Theory.
—Implemented a constrained local search algorithm for the Balanced Incomplete Block Design problem.
—Developed tools for problems such as study recommendation to students, log analysis and business analytics.

Google Inc. Books project.

Q3/2011 *Position: Software Engineering intern*
—Developed a technique to dewarp pictures of open books by fitting isometric mappings (developable surfaces) to 3D data.
—Developed a signal phase estimation method for a scanner.

Portfolio

Journal articles **Corisco: Robust edgel-based orientation estimation for generic camera models**, *Nicolau Werneck and Anna Helena Reali Costa*. Image and Vision Computing, 2013. `http://dx.doi.org/10.1016/j.imavis.2013.10.004`

Mapping with monocular vision in two dimensions, *Nicolau Werneck and Anna Helena Reali Costa*. International Journal of Natural Computing Research 1(4), 2010. `http://dx.doi.org/10.4018/978-1-4666-1574-8.ch022`

Event articles **ChipSort: a SIMD and cache-aware sorting module**, *Nicolau Leal Werneck*. JuliaCon, USA, 2019. `http://b.link/youtube371`

Speeding up probabilistic inference of camera orientation by function approximation and grid masking, *Nicolau Leal Werneck and Anna Helena Reali Costa*. WSCG, Czech Republic, 2011.

Monocular visual mapping with the Fast Hough Transform, *Nicolau Leal Werneck and Anna Helena Reali Costa*. WVC, Brazil, 2010.

Software projects **ChipSort**, a Julia library for cache-aware and SIMD sorting, 2019. `http://b.link/chipsort`

geekie-bayes, Bayesian tree learning with generic algorithm, in Scala *(Geekie)*, 2015. `http://b.link/bayes`

corisco, a method to estimate camera orientation from a single picture *(doctorate)*, 2012. `http://goo.gl/du3gcH`

featherweight, prototype to demonstrate a method to fit a developable surface to a 3D point cloud in order to dewarp pictures of open books *(Google)*, 2011.

Misc `do-block` *Considered Harmless*, JuliaCon 2022. `https://pretalx.com/juliacon-2022/talk/WKNY78/`

A Linux webcam driver patch, 2010. `http://goo.gl/rZDbk`

Sequence A140261 on OEIS, 2008. `http://oeis.org/A140261`