

Néstor O. Pérez-Arancibia

Work

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Research and Teaching Interests

My experience, and research and teaching interests are in the areas of mechatronics, robotics, feedback control, signal processing, dynamics, applied optics, fabrication of microrobots, and biologically inspired engineering.

Education

Ph.D. Mechanical Engineering

University of California, Los Angeles, October 2007
Major Field: Systems and Control
Minor Field: Signal Processing (Electrical Engineering)
Dissertation: *Adaptive Control of Opto-Electro-Mechanical Systems for Broadband Disturbance Rejection*
Advisors: Prof. James S. Gibson and Prof. Tsu-Chin Tsao

M.S. Mechanical Engineering

University of California, Los Angeles, June 2003
Major Field: Systems and Control
Advisor: Prof. James S. Gibson

M.S. Engineering Science

Pontificia Universidad Católica de Chile, June 2000
Major Field: Dynamics, Automatic Control and Signal Processing
Dissertation: *Modeling and Simulation of a Six-degree-of-freedom Mechanism with Structural Interactions* (in Spanish)
Advisors: Prof. Juan Carlos De La Llera (Structural Engineering Department) and Prof. Aldo Cipriano (Electrical Engineering Department)

Engineer Degree (Industrial and Electrical Engineering)

Pontificia Universidad Católica de Chile, June 2000
Graduated with Distinction

B.S. Engineering Science

Pontificia Universidad Católica de Chile, August 1997
Graduated with Distinction

Employment

Assistant Professor

Dept. of Aerospace and Mechanical Engineering
Viterbi School of Engineering
University of Southern California (USC)

8/2013–Present

Research Associate Microrobotics Laboratory (R. J. Wood's Group) School of Engineering and Applied Sciences Harvard University	4/2013–8/2013
Postdoctoral Fellow Microrobotics Laboratory (R. J. Wood's Group) School of Engineering and Applied Sciences Harvard University	4/2010–3/2013
Postdoctoral Scholar Mechanical and Aerospace Engineering Dept. University of California, Los Angeles (UCLA)	10/2007–3/2010
Lecturer Mechanical and Aerospace Engineering Dept. University of California, Los Angeles (UCLA)	6/2009–8/2009
Graduate Student Researcher Mechanical and Aerospace Engineering Dept. University of California, Los Angeles (UCLA)	8/2002–10/2007
Engineer ICIL-ICAFAL S.A., Chile	7/2001–8/2002
Graduate Student Researcher School of Engineering, Pontificia Universidad Católica de Chile	1/1998–6/2000
Intern Peugeot Chile	1/1997–3/1997

Teaching Experience

Assistant Professor / Instructor University of Southern California (USC) AME 451 – Linear Control Systems I	Spring, 2015
Assistant Professor / Instructor University of Southern California (USC) AME 541 – Linear Control Systems II	Fall, 2014
Assistant Professor / Instructor University of Southern California (USC) AME 443 – Control Systems Laboratory	Spring, 2014
Lecturer / Instructor University of California, Los Angeles (UCLA) MECH&AE 171A – Introduction to Feedback and Control Systems	Summer, 2009
Guest Lecturer / Instructor University of California, Los Angeles (UCLA) MECH&AE 277 – Advanced Digital Control for Mechatronic Systems	Winter, 2009

Publications

Journal Articles (Published)

[J13] **N. O. Pérez-Arancibia**, P.-E. J. Duhamel (co-first author), K. Y. Ma, and R. J. Wood, “Model-Free Control of a Hovering Flapping-Wing Microrobot,” in *Journal of Intelligent & Robotic Systems*, vol. 77, no. 1, pp. 95–111, Jan. 2015.

[J12] Y.-L. Park, B. Chen, **N. O. Pérez-Arancibia**, D. Young, L. Stirling, R. J. Wood, E. C. Goldfield, and R. Nagpal, “Design and Control of a Bio-Inspired Soft Wearable Robotic Device for Ankle–Foot Rehabilitation,” in *Bioinspiration & Biomimetics*, 9 (2014) 016007 (17pp).

[J11] P.-E. J. Duhamel, **N. O. Pérez-Arancibia (co-first author)**, G. L. Barrows, and R. J. Wood, “Biologically Inspired Optical-Flow Sensing for Altitude Control of Flapping-Wing Microrobots¹,” in *IEEE/ASME Transactions on Mechatronics*, vol. 18, no. 2, pp. 556–568, Apr. 2013.

[J10] **N. O. Pérez-Arancibia**, J. P. Whitney, and R. J. Wood, “Lift Force Control of Flapping-Wing Microrobots Using Adaptive Feedforward Schemes,” in *IEEE/ASME Transactions on Mechatronics*, vol. 18, no. 1, pp. 155–168, Feb. 2013.

[J9] R. J. Wood, B. Finio, M. Karpelson, K. Ma, **N. O. Pérez-Arancibia**, P. S. Sreetharan, H. Tanaka, and J. P. Whitney, “Progress on ‘pico’ air vehicles,” in *The International Journal of Robotics Research*, vol. 31, no. 11, pp. 1292–1302, Sep. 2012.

[J8] **N. O. Pérez-Arancibia**, J. S. Gibson, and T.-C. Tsao, “Observer-Based Intensity-Feedback Control for Laser Beam Pointing and Tracking,” in *IEEE Transactions on Control Systems Technology*, vol. 20, no. 1, pp. 31–47, Jan. 2012.

[J7] **N. O. Pérez-Arancibia**, K. Y. Ma, K. C. Galloway, J. D. Greenberg, and R. J. Wood, “First Controlled Vertical Flight of a Biologically-Inspired Microrobot,” in *Bioinspiration & Biomimetics*, 6 (2011) 036009 (11pp).

[Journal’s Highlight of 2011. Journal’s Most Cited Paper During the Period 2012–2013.](#)

[J6] J. Levin, **N. O. Pérez-Arancibia**, and P. A. Ioannou, “Adaptive Notch Filter using Real-Time Parameter Estimation,” in *IEEE Transactions on Control Systems Technology*, vol. 19, no. 3, pp. 673–681, May 2011.

[J5] **N. O. Pérez-Arancibia**, T.-C. Tsao, and J. S. Gibson, “A New Method for Synthesizing Multiple-Period Adaptive-Repetitive Controllers and its Application to the Control of Hard Disk Drives,” in *Automatica*, vol. 46, no. 7, pp. 1186–1195, Jul. 2010.

[J4] **N. O. Pérez-Arancibia**, T.-C. Tsao, and J. S. Gibson, “Saturation-Induced Instability and its Avoidance in Adaptive Control of Hard Disk Drives,” in *IEEE Transactions on Control Systems Technology*, vol. 18, no. 2, pp. 368–382, Feb. 2010.

[J3] **N. O. Pérez-Arancibia**, J. S. Gibson, and T.-C. Tsao, “Frequency-Weighted Minimum-Variance Adaptive Control for Laser Beam Jitter Suppression,” in *IEEE/ASME Transactions on Mechatronics*, vol. 14, no. 3, pp. 337–348, Jun 2009.

[J2] J. Levin, **N. O. Pérez-Arancibia**, P. A. Ioannou, and T.-C. Tsao, “A Neural-Networks-Based Adaptive Disturbance Rejection Method and its Application to the Control of Hard Disk Drives,” in *IEEE Transactions on Magnetics*, vol. 45, no. 5, pp. 2140–2150, May 2009.

¹P.-E. J. Duhamel and N. O. Pérez-Arancibia contributed equally to this work.

[J1] **N. O. Pérez Arancibia**, N. Chen, S. Gibson, and T.-C. Tsao, “Variable-order adaptive control of a microelectromechanical steering mirror for suppression of laser beam jitter,” *Optical Engineering*, vol. 45, no. 10, pp. 104206-1–12, Oct. 2006.

Book Chapter (Published)

[B1] H. Tanaka, B. M. Finio, M. Karpelson, **N. O. Pérez-Arancibia**, P. S. Sreetharan, J. P. Whitney, and R. J. Wood, “Insect Flight and Micro Air Vehicles (MAVs),” in *Encyclopedia of Nanotechnology*, New York, NY: Springer, 2012, ch. 10, pp. 1096–1109.

Conference Articles (Published)

[C22] **N. O. Pérez-Arancibia**, P.-E. J. Duhamel (co-first author), K. Y. Ma, and R. J. Wood, “Model-Free Control of a Flapping-Wing Flying Microrobot,” in *Proceedings of the 16th International Conference on Advanced Robotics (ICAR 2013)*, Montevideo, Uruguay, Nov. 2013.
Winner: Best Paper Award.

[C21] Z. E. Teoh, S. B. Fuller, P. Chirarattananon, **N. O. Pérez-Arancibia**, J. D. Greenberg, and R. J. Wood, “A Hovering Flapping-Wing Microrobot with Altitude Control and Passive Upright Stability,” in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2012)*, Vilamoura, Algarve, Portugal, Oct. 2012, pp. 3209–3216.

[C20] R. J. Wood, B. Finio, M. Karpelson, **N. O. Pérez Arancibia**, P. Sreetharan, and J. P. Whitney, “Challenges for micro-scale flapping-wing micro air vehicles,” in *Proceedings of the SPIE 8373, Micro- and Nanotechnology Sensors, Systems, and Applications IV*, Baltimore, MD, May 2012, 83731J.

[C19] P. Chirarattananon, **N. O. Pérez-Arancibia (co-first author)**, and R. J. Wood, “Wing Trajectory Control for Flapping-Wing Microrobots Using Combined Repetitive and Minimum-Variance Adaptive Methods²,” in *Proceedings of the American Control Conference*, Montreal, Canada, Jun. 2012, pp. 3831–3838.

[C18] P.-E. J. Duhamel, **N. O. Pérez-Arancibia**, G. L. Barrows, and R. J. Wood, “Altitude Feedback Control of a Flapping-Wing Microrobot Using an On-Board Biologically Inspired Optical Flow Sensor,” in *Proceedings of the 2012 IEEE International Conference on Robotics and Automation*, St. Paul, MN, May 2012, pp. 4228–4235.

[C17] **N. O. Pérez-Arancibia**, P. Chirarattananon, B. M. Finio, and R. J. Wood, “Pitch-Angle Feedback Control of a Biologically Inspired Flapping-Wing Microrobot,” in *Proceedings of the 2011 IEEE International Conference on Robotics and Biomimetics*, Phuket Island, Thailand, Dec. 2011, pp. 1495–1502.

Finalist: Best Paper in Biomimetics.

[C16] R. J. Wood, B. Finio, M. Karpelson, K. Ma, **N. O. Pérez-Arancibia**, P. S. Sreetharan, H. Tanaka, and J. P. Whitney, “Progress on “pico” air vehicles,” in *Proceedings of the 15th International Symposium on Robotics Research*, Flagstaff, AZ, Aug.–Sep. 2011.

[C15] B. M. Finio, **N. O. Pérez-Arancibia**, R. J. Wood, “System Identification and Linear Time-Invariant Modeling of an Insect-Sized Flapping-Wing Micro Air Vehicle,” in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*, San Francisco, CA, Sep. 2011, pp. 1107–1114.

²P. Chirarattananon and N. O. Pérez-Arancibia contributed equally to this work.

- [C14] **N. O. Pérez-Arancibia**, J. P. Whitney, and R. J. Wood, “Lift Force Control of a Flapping-Wing Microrobot,” in *Proceedings of the American Control Conference*, San Francisco, CA, Jun.–Jul. 2011, pp. 4761–4768.
- [C13] **N. O. Pérez-Arancibia**, T.-C. Tsao, and J. S. Gibson, “Multiple-Period Adaptive-Repetitive Control of a Hard Disk Drive,” in *Proceedings of the 48th IEEE Conference on Decision and Control and 28th Chinese Control Conference*, Shanghai, China, Dec. 2009, pp. 5432–5439.
- [C12] **N. O. Pérez-Arancibia**, J. S. Gibson, and T.-C. Tsao, “Laser Beam Pointing and Stabilization by Intensity Feedback Control,” in *Proceedings of the American Control Conference*, Saint Louis, MI, Jun. 2009, pp. 2837–2842.
- [C11] J. Levin, **N. O. Pérez Arancibia**, P. A. Ioannou, and T.-C. Tsao, “Adaptive Disturbance Rejection for Disk Drives Using Neural Networks,” in *Proceedings of the American Control Conference*, Seattle, WA, Jun. 2008, pp. 2993–2998.
- [C10] **N. O. Pérez Arancibia**, C.-Y. Lin, T.-C. Tsao, and J. S. Gibson, “Adaptive-Repetitive Control of a Hard Disk Drive,” in *Proceedings of the 46th IEEE Conference on Decision and Control*, New Orleans, LA, Dec. 2007, pp. 4519–4524.
- [C9] **N. O. Pérez Arancibia**, C.-Y. Lin, T.-C. Tsao, and J. S. Gibson, “Adaptive and Repetitive Control for rejecting repeatable and non-repeatable runout in rotating devices,” in *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, Seattle, WA, Nov. 2007, IMECE2007–43534.
- [C8] **N. O. Pérez Arancibia**, J. S. Gibson, and T.-C. Tsao, “Saturation and Frequency Weighting in Adaptive Control of Laser Beam Jitter,” in *Proceedings of the SPIE 6709, Free-Space Laser Communications VII*, San Diego, CA, Aug. 2007, 6709–27.
- [C7] **N. O. Pérez Arancibia**, T.-C. Tsao, and S. Gibson, “Adaptive Tuning and Control of a Hard Disk Drive,” in *Proceedings of the American Control Conference*, New York, NY, Jun. 2007, pp. 1526–1531.
- [C6] **N. O. Pérez Arancibia**, N. Chen, S. Gibson, and T.-C. Tsao, “Adaptive Control of Jitter in Laser Beam Pointing and Tracking,” in *Proceedings of the SPIE 6304, Free-Space Laser Communications VI*, San Diego, CA, Sep. 2006, 63041G.
- [C5] **N. O. Pérez Arancibia**, “Convex-optimization-based enforcement of robust BIBO stability on the AIC scheme using a modified RLS algorithm,” in *Proceedings of the 2006 IEEE International Conference on Acoustics, Speech and Signal Processing*, Toulouse, France, May 2006, pp. III-568–III-571.
- [C4] **N. O. Pérez Arancibia**, and T.-C. Tsao, “Robustly ℓ_∞ -stable Implementation of the Adaptive Inverse Control Scheme for Noise Cancellation,” in *Proceedings of the 44th IEEE Conference on Decision and Control and European Control Conference*, Seville, Spain, Dec. 2005, pp. 5800–5807.
- [C3] **N. O. Pérez Arancibia**, N. Chen, S. Gibson, and T.-C. Tsao, “Adaptive control of a MEMS steering mirror for free-space laser communications,” in *Proceedings of the SPIE 5892, Free-Space Laser Communications V*, San Diego, CA, Sep 2005, 589210.
- [C2] **N. O. Pérez Arancibia**, N. Chen, S. Gibson, and T.-C. Tsao, “Adaptive Control of a MEMS Steering Mirror for Suppression of Laser Beam Jitter,” in *Proceedings of the American Control Conference*, Portland, OR, Jun. 2005, pp. 3586–3591.

[C1] N. O. Pérez Arancibia, S. Gibson, and T.-C. Tsao, “Adaptive control of MEMS mirrors for beam steering,” in *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, Anaheim, CA, Nov. 2004, IMECE2004–60256.

Conference Abstract (Published)

[A1] N. O. Pérez-Arancibia, “Design, Fabrication, and Control of Sub-Gram Flapping-Wing Artificial Flyers,” in *Proceedings of the 17th U.S. Congress on Theoretical and Applied Mechanics (USNCTAM 2014)*, East Lansing, MI, Jun. 2014.

Research Impact

- Google Scholar Citations (March 16, 2015): **434**; Google Scholar h-index (March 16, 2015): **14**; Google Scholar i10-index (March 16, 2015): **20**.
- Web of Science Citations (March 16, 2015): **125**; Web of Science h-index (March 16, 2015): **8**.

Selected Invited Talks

- Department of Aerospace and Mechanical Engineering, **University of Southern California (USC)**, Los Angeles, CA, March 2013. “*Design, Fabrication, and Control of Flapping-Wing Artificial Insects.*”
- Department of Mechanical and Industrial Engineering, **University Illinois, Chicago (UIC)**, Chicago, IL, February 2013. “*The Intrinsic Multidisciplinary Nature of Mechatronic and Robotic Research: From Laser Beams to Memory Storage to Flapping-Wing Flying Artificial Insects.*”
- Department of Mechanical and Industrial Engineering, **Rensselaer Polytechnic Institute (RPI)**, Troy, NY, February 2013. “*The Intrinsic Multidisciplinary Nature of Mechatronic and Robotic Research: From Laser Beams to Memory Storage to Flapping-Wing Flying Artificial Insects.*”
- Department of Mechanical Engineering, **Iowa State University of Science and Technology**, Ames, IA, April 2012. “*Design, Fabrication, and Control of Flapping-Wing Microrobots.*”
- Department of Mechanical Engineering, **Johns Hopkins University**, Baltimore, MD, April 2012. “*Design, Fabrication, and Control of Flapping-Wing Microrobots.*”
- Department of Mechanical Engineering, **Texas A&M University**, College Station, TX, March 2012. “*Design, Fabrication, and Control of Flapping-Wing Microrobots.*”
- Department of Mechanical Engineering & Materials Science, **University of Pittsburgh**, Pittsburgh, PA, March 2012. “*Design, Fabrication, and Control of Flapping-Wing Microrobots.*”
- Department of Electrical Engineering and Computer Science, **University of Tennessee, Knoxville**, Knoxville, TN, March 2012. “*Design, Fabrication, and Control of Flapping-Wing Microrobots.*”
- Department of Mechanical Science and Engineering, **University of Illinois, Urbana-Champaign**, Urbana, IL, January 2012. “*Design, Fabrication, and Control of Flapping-Wing Microrobots.*”
- Department of Mechanical Engineering, **University of Maryland**, College Park, MD, November 2011. “*Design, Fabrication, and Control of Flapping-Wing Microrobots.*”

- Mechanical & Aerospace Engineering Department, **University of California, Los Angeles (UCLA)**, Los Angeles, CA, November 2011. “*Design, Fabrication, and Control of Flapping-Wing Microrobots.*”
- Department of Mechanical Engineering, **Pontificia Universidad Católica de Chile**, Santiago, Chile, August 2011. “*High-Performance Control and Its Prominent Role in the Emerging Fields of Biomechatronics and Microrobotics.*”
- Department of Mechanical Engineering, **University of California, Riverside (UCR)**, Riverside, CA, April 2011. “*High-Performance Control and Its Prominent Role in the Emerging Fields of Biomechatronics and Microrobotics.*”
- Department of Mechanical Engineering, **Columbia University**, New York, NY, March 2011. “*High-Performance Control and Its Prominent Role in the Emerging Fields of Biomechatronics and Microrobotics.*”

Other Talks

- 2004 UCLA Systems and Controls Symposium, May 2004. “*Adaptive Control of MEMS mirrors for beam steering.*”
- 2005 UCLA Systems and Controls Symposium, May 2005. “*Variable-order adaptive control of MEMS steering mirrors for suppression of laser beam jitter.*”
- UCLA Systems, Dynamics, and Controls Seminar Series, October 2007. “*Adaptive Control of Hard Disk Drives.*”

Awards, Nominations, and Honors

- 2013 Winner of the Best Paper Award, 16th *International Conference on Advanced Robotics (ICAR 2013)*.
- 2012 Journal’s Highlight of 2011, *Bioinspiration & Biomimetics*.
- 2011 Finalist for Best Paper in Biomimetics, *IEEE International Conference on Robotics and Biomimetics (IEEE-ROBIO 2011)*.
- Nomination for the 2010 UCLA Chancellor’s Award for Postdoctoral Research. Of the approximately 1200 registered UCLA postdoctoral scholars, 32 were nominated for the award in 2010. (<http://www.gdnet.ucla.edu/deans/event/postdocshw.htm>).
- Nonresident Tuition Fellowship – University of California, Los Angeles, 2002–2007.
- FIUC Scholarship – Pontificia Universidad Católica de Chile, 1994–1999.

Professional Affiliations and Activities

- Member: ASME; IEEE.
- Conference Reviewer: IMECE-2004; CDC-2006; CDC-2007; ACC-2009; ACC-2010; CDC-2010; ACC-2011; CDC-2011; ACC-2012; CDC-2012; IROS-2012; DSCC/MOVIC 2012.
- Journal Reviewer: Automatica (Elsevier); Bioinspiration & Biomimetics (IOP Science); Optics & Laser Technology (Elsevier); IEEE/ASME Transactions on Mechatronics; Asian Journal of Control;

IEEE Transactions on Robotics; IEEE Transactions on Neural Networks and Learning Systems; Autonomous Robots (Springer).

- National Science Foundation (NSF) Panel Reviewer, May 2014.
- National Science Foundation (NSF) Panel Reviewer, May 2015.
- Book Proposal Reviewer: “*Flapping Winged Flight: Analysis, Synthesis, and Construction (D. Doman et al.)*,” submitted to John Wiley & Sons.
- Session Chair, Mechatronics, 48th IEEE Conf. on Decision and Control and 28th Chinese Control Conference, Shanghai, China, December 2009.
- Session Co-Chair, Mechatronics, American Control Conference, San Francisco, CA, July 2011.
- Editor, 2012 ASME Dynamic Systems and Control Conference, Fort Lauderdale, FL, October 2012.

Languages and Computer Skills

- Fluent in English and Spanish.
- C/C++; Matlab/Simulink; LabView.

Personal Information

- Citizenship: Chilean.
- Immigration Status: O-1 visa.

References

Prof. James S. Gibson

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Prof. Robert J. Wood

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Prof. Robert T. M'Closkey

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Prof. Gu-Yeon Wei

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