

João Luiz Almeida de Souza Ramos

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EDUCATION:

PhD, Mechanical Engineering	2013 - 2018
Massachusetts Institute of Technology (MIT), USA	
Thesis: “ <i>Humanoid Robot Dynamic Synchronization via Whole-Body Teleoperation with Bilateral Feedback</i> ”. Advisor: Sangbae Kim	
Kaufman Teaching Certificate Program, Teaching and Learning Lab	2019
Massachusetts Institute of Technology (MIT), USA	
Collins Scholar, Academy for Excellence in Engineering Education	2019-2020
University of Illinois at Urbana-Champaign (UIUC), USA	
MSc, Mechanical Engineering	2011 – 2012
Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Brazil	
Thesis title: “ <i>Torque Control of an Exoskeleton Actuated by Pneumatic Artificial Muscles Using Electromyography Signals</i> ”. Advisor: Marco A. Meggiolaro	
Undergraduate Visiting Student	2009 - 2010
Polytechnic University of Milan (PoliMi), Italy	
BSc, Control and Automation Engineering	2006 - 2010
Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Brazil	
Thesis title: “ <i>Simulation and Control with Kalman Filter of a Double Inverted Pendulum with Spinning Base</i> ”. Advisor: Marco A. Meggiolaro	

ACADEMIC EXPERIENCE:

Assistant Professor, Dept of Mechanical Science and Engineering	2019 - present
Director of RoboDesign Lab	
University of Illinois at Urbana-Champaign (UIUC), USA	
Affiliate Faculty, Dept of Electrical and Computer Engineering	2019 - present
University of Illinois at Urbana-Champaign (UIUC), USA	
Postdoctoral Associate, Biomimetic Robotics Laboratory	2018 - 2019
Massachusetts Institute of Technology (MIT), USA	
- Developing a teleoperation system for dynamic mobile manipulation of the MIT Cheetah 3 quadruped robot. Advised by Prof. Sangbae Kim.	
Research Assistant, Biomimetic Robotics Laboratory	2013 - 2018
Massachusetts Institute of Technology (MIT), USA	
- Developing a whole-body teleoperation system to dynamically control a bipedal robot via bilateral feedback. Advised by Prof. Sangbae Kim.	
Research Assistant, Robotics Laboratory	2011 - 2013
Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Brazil	
- Development of an upper-body exoskeleton for human augmentation utilizing EMG and pneumatic muscles. Advised by Prof. Marco Meggiolaro.	
Undergraduate Research Assistant, CartCas Laboratory	2009 - 2010

Polytechnic University of Milan (PoliMi), Italy

- Development of a simulation tool for Visual Servoing Control of a six DoF manipulator for Computer Assisted Surgery. Advised by Prof. Pietro Cerveri.

Undergraduate Research Assistant, Dep. of Mechanical Engineering 2008 - 2009

Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Brazil

- Development of a C/C++ software for Finite Element Analysis of Cylindrical and Spherical Shells under axial and radial loads. Advised by Prof. Carlos A. Almeida.

Undergraduate Research Assistant, Van de Graaff Laboratory 2006 - 2007

Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Brazil

- Application of the Particle Induced X-Ray Emission (*PIXE*) Technique for Organic Analysis at the Van der Graff Laboratory. Advised by Prof. Kenya Moore.

TEACHING EXPERIENCE:

ME 446 – Robot Dynamics and Control, MechSE/ISE/ECE Spring 2020/2021

University of Illinois at Urbana-Champaign, USA

ME 371 – Mechanical Design II, MechSE Fall 2109

University of Illinois at Urbana-Champaign, USA

Machine Shop Mentor, MIT MakerWorkshop Fall 2015

Massachusetts Institute of Technology (MIT), USA

- Instructed and supervised members of a student-run machine shop to operate machines and electronic instruments for manufacturing and prototyping.

Graduate Teaching Assistant, Dep. of Mechanical Eng. Fall 2011, Spring 2012

Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Brazil

- Held regular recitations and taught four lectures of a course on rigid-body dynamics for undergraduate Mechanical Engineering students. Advised by Prof. Hans Weber.

Undergraduate Teaching Assistant, Dep. of Physics Spring 2008

Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Brazil

- Laboratory instructor and grader for a course on Fluids and Thermodynamics for undergraduate Engineering students. Advised by Prof. Kenya Moore.

PROFESSIONAL EXPERIENCE:

Mechanical Project Engineer 2013

GT2 Energy, Brazil

- Mechanical designer of a magnetic robot for power plant visual inspection.

Professional Internship Summer/Fall 2010

Inspection Technology Research Center (*CPTI*), Petrobras, Brazil

- Testing and validation of the embedded electronics and sensors used on the Pipeline Inspection Gauge (PIG) robot for the visual inspection of pipes and risers.

RESEARCH GRANTS:

1. Principal investigator for NSF M3X: “*CAREER: Remote Control of Humanoid Robot Locomotion using Human Whole-body Movement and Mutual Adaptation*” # 2043339, \$736,877, from 4/21 to 03/26.
2. Principal investigator for NSF NRI 2.0: “*NRI: FND: Immersive whole-body teleoperation of wheeled humanoid robots for dynamic mobile manipulation*” #2024775, \$750,000, from 10/20 to 09/23.
3. Principal investigator for Google Gift 2021 “A high-force haptic device for whole-body Power Manipulation with humanoid robots”, \$30,000, from 05/21 to 05/22.

4. Senior Personnel for NSF NRI 2.0: “NRI: INT: MiaPURE (Modular, Interactive and Adaptive Personalized Unique Rolling Experience)” #2024905, \$1,499,539, from 09/20 to 09/24.

SERVICE AND LEADERSHIP ACTIVITIES:

1. Associate Editor (Mechanisms, Design, and Control) for the 2021 IEEE International Conference on Robotics and Automation (ICRA 2021)
2. Co-organizer of the “Workshop on Teleoperation of Dynamic Legged Robots in Real Scenarios”, 2021 IEEE International Conference on Robotics and Automation (ICRA 2021)
3. [MAVIS](#) Future Faculty Fellow mentor: Jiho Kim and Shabnam Bonyadi **2019-2020**
4. [Illinois Robotics](#) core faculty – Education Committee **2019 – present**

PUBLICATIONS UNDER PEER-REVIEW:

1. K. Darvish, L. Penco, **J. Ramos**, R. Cisneros Limon J. Pratt, E. Yoshida, S. Ivaldi, D. Pucci, “Teleoperation of Humanoid Robots: A Survey”, 2021

JOURNAL PUBLICATIONS:

1. **J. Ramos** and S. Kim, “Dynamic locomotion synchronization of bipedal robot and human operator via bilateral feedback teleoperation”, Vol. 4, Issue 35, Science Robotics, 2019.
2. **J. Ramos** and S. Kim, "Dynamic Bilateral Teleoperation of the Cart-Pole: A Study Toward the Synchronization of Human Operator and Legged Robot," in IEEE Robotics and Automation Letters, vol. 3, no. 4, pp. 3293-3299, Oct. 2018 (presented at IROS 2018).
3. **J. Ramos** and S. Kim, "Humanoid Dynamic Synchronization Through Whole-Body Bilateral Feedback Teleoperation," in IEEE Transactions on Robotics, vol. 34, no. 4, pp. 953-965, Aug. 2018 (presented at ICRA 2019).

MAGAZINE ARTICLES:

1. **J. Ramos**, A. Wang and S. Kim, "The brain in the machine: MIT is building robots that use full-body teleoperation to move with greater agility," in IEEE Spectrum, vol. 56, no. 6, pp. 22-27, June 2019, doi: 10.1109/MSPEC.2019.8727142.

CONFERENCE PAPERS:

1. **J. Ramos**, Y. Ding, Y. Sim, K. Murphy, and D. Block, “HOPPY: An Open-source Kit for Education with Dynamic Legged Robots”, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.
2. S. Wang, K. Murphy, D. Kenney, and **J. Ramos**, “A Comparison Between Joint Space and Task Space Mappings for Dynamic Teleoperation of an Anthropomorphic Robotic Arm in Reaction Tests”, IEEE International Conference on Robotics and Automation (ICRA), 2021.
3. Y. Sim and **J. Ramos**, “The dynamic effect of mechanical losses of actuators on the equations of motion of legged robots”, IEEE International Conference on Robotics and Automation (ICRA), 2021.
4. **J. Ramos**, B. Katz, M. Y. M. Chuah and S. Kim, "Facilitating Model-Based Control Through Software-Hardware Co-Design," 2018 IEEE International Conference on Robotics and Automation (ICRA), Brisbane, QLD, 2018, pp. 566-572.
5. **J. Ramos** and S. Kim, "Improving humanoid posture Teleoperation by Dynamic Synchronization through operator motion anticipation," IEEE International Conference on Robotics and Automation (ICRA), Singapore, 2017, pp. 5350-5356.
6. **J. Ramos**, A. Wang and S. Kim, "Robot-human balance state transfer during full-body humanoid teleoperation using Divergent Component of Motion dynamics," IEEE International Conference on Robotics and Automation (ICRA), Stockholm, 2016, pp. 1587-1592.

7. **J. Ramos**, A. Wang, W. Ubellacker, J. Mayo and S. Kim, "*A balance feedback interface for whole-body teleoperation of a humanoid robot and implementation in the HERMES system*," IEEE-RAS 15th International Conference on Humanoid Robots (Humanoids), Seoul, 2015, pp. 844-850.
8. A. Wang, **J. Ramos**, J. Mayo, W. Ubellacker, J. Cheung and S. Kim, "*The HERMES humanoid system: A platform for full-body teleoperation with balance feedback*," IEEE-RAS 15th International Conference on Humanoid Robots (Humanoids), Seoul, 2015, pp. 730-737.
9. **J. Ramos**, A. Wang and S. Kim, "*A Balance Feedback Human Machine Interface for humanoid teleoperation in dynamic tasks*," IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Hamburg, 2015, pp. 4229-4235.
10. **Joao Luiz A. S. Ramos**, and Marco A. Meggiolaro, "*Use of Surface Electromyography for Human Amplification Using an Exoskeleton Driven by Artificial Pneumatic Muscles*", 5th IEEE/RAS-EMBS International Conference on Biomedical Robotics and Biomechanics (BioRob 2014), Sao Paulo, Brazil, August 12-15, 2014.
11. **Ramos, J.L.A.S.**, Meggiolaro, M.A., "*Use of Surface Electromyography to Control an Active Upper Limb Exoskeleton Actuated by Pneumatic Artificial Muscles and Optimized with Genetic Algorithms*", in Section VI: Hydraulics & Pneumatics, ABCM Symposium Series in Mechatronics v.6 (ISBN 978-85-85769-52-9), Brazilian Society of Mechanical Sciences and Engineering, Rio de Janeiro, Brasil, pp.757-768, 2014.
12. **Joao Luiz A. S. Ramos**, and Marco A. Meggiolaro, "*Use of Surface Electromyography to Control an Active Upper Limb Exoskeleton Actuated by Pneumatic Artificial Muscles and Optimized with Genetic Algorithms*", 22nd International Congress of Mechanical Engineering (COBEM), Ribeirao Preto, Brazil, November 3 – 7, 2013.
13. **Joao Luiz A. S. Ramos**, and Marco A. Meggiolaro, "*Torque Control of an Active Upper Limb Exoskeleton with Pneumatic Artificial Muscles Using sEMG and a Modified Hill-Type Muscle Model*", 4th National Meeting of Biomechanical Engineering, Vitoria, ES, Brazil, April 25th – 27th, 2013.
14. **Joao Luiz A. S. Ramos**, and Marco A. Meggiolaro, "*Drum Shape Design and Optimization using Genetic Algorithms*", Robogames Scientific Symposium, San Mateo, CA, 2012.
15. **Ramos, J. L.** ; LIMA, Cintia Monteiro de ; Magalhães, S. D ; Medeiros, Geiza ; Dias da Cunha, Kenya , "*PIXE Technique Applied to Charaterize Tupinamba Ceramics*" National Meeting on Physics and Condensed Matter, Sao Paulo, Brazil : SBF, 2007.
16. Ribeiro, F. C. A. ; Lauria, D. C. ; Medeiros, Geiza ; Dias da Cunha, Kenya ; **Ramos, J. L.**; LIMA, Cintia Monteiro de ., "*PIXE Technique Applied for Vegetable Analysis*" National Meeting on Condensed Matter Physics, Sao Paulo, Brazil : SBF, 2007.
17. CARNEIRO, Luana Gomes ; Medeiros, Geiza ; Dias da Cunha, Kenya ; LIMA, Cintia Monteiro de ; **Ramos, J. L.** . "*Occupational Exposure to Mineral Dust Particles Containing Uranium*" National Meeting on Physics and Condensed Matter, Sao Paulo, Brazil : SBF, 2007.
18. Carneiro, Luana Gomes ; Medeiros, Geiza ; Dias da Cunha, Kenya ; LIMA, Cintia Monteiro de ; C V Barros Leite ; **Ramos, J. L.** . "*Occupational Exposure to Uranium Particles*", International Nuclear Atlantic Conference, Santos, Brazil, 2007.

PATENTS:

1. Bleakney, A.W., Elliott, J.R., Hsiao-Wecksler, E.T., Malik, P.B., McDonagh, D.C., Rausin, A.K., Norris, W.R., Almeida de Souza Ramos, J.L, Xiao, C., Chen, Y., Pei, Y., Song, SY, "A Low-Profile and High-load Ball-Balancing Rolling System", Invention disclosure submitted, July 25, 2020. U.S. Provisional Patent Application No.: 63/074,126, submitted Sept. 3, 2020.

INVITED TALKS AND EVENTS:

1. IEEE International Electric Machines and Drives Conference (IEMDC), invited panelist on Robotics and Automation, May 2021.
2. Semiautonomous Seminar Series, University of California, Berkeley, November 2020.
3. Workshop on Multidisciplinary Approaches to Advance Physical Human-Robot Interaction, IEEE International Conference on Robotics and Automation (ICRA), Paris, 2020.
4. Workshop on Teleoperation of Humanoid Robots, IEEE International Conference on Humanoid Robots (Humanoids), Toronto, 2019.
5. Illinois Robotics Seminar Series, Coordinated Science Lab (CSL), October 2019.
6. Dep. of Mechanical Engineering Seminar Series, University of Minnesota Twin-Cities, March 2019.
7. Dep. of Mechanical Engineering Seminar Series, University of Delaware, March 2019.
8. Dep. of Mechanical and Industrial Engineering Seminar Series, University of Massachusetts Amherst, February 2019.
9. Dep. of Mechanical Science and Engineering Seminar Series, University of Illinois at Urbana-Champaign, January 2019.
10. Disney Research Los Angeles, CA, July 2018.
11. “*Human-Machine Interfaces and the control of humanoid robots via remote teleoperation*”. Brazilian Researchers and Students in Boston Seminar (PUB-Boston), Boston, MA, August 2018.
12. “*The MIT HERMES Project: A System for Bilateral Feedback Teleoperation and Disaster Response*”, Robotics and Controls Seminar, Concordia University, Montreal, Canada, November 2015.
13. “*Drum Shape Design and Optimization using Genetic Algorithms*”, RoboGames 2012 Scientific Symposium, San Mateo, CA, April 2012.

SELECTED HONORS AND AWARDS:

1. NSF CAREER Award 2021
2. List of Teachers Ranked as Excellent By Their Students, Spring 2021.
3. *Science without Borders*, full 4-years doctorate fellowship, 2013 (declined).
4. *National Council for Scientific and Technological Development (CNPq)*, full 2-years MSc fellowship, 2011.
5. 3rd place at the MIT Alumni Research Slam, December 2020.
6. 3rd place at the *2018 MIT Mechanical Engineering de Florez Award* competition, Graduate Design category, May 2018.
7. 2nd place at *UAE AI & Robotics for Good Award*, competing with 664 teams from 121 countries, Dubai, UAE, February 2016.
8. 2nd place at the *2015 MIT Mechanical Engineering de Florez Award* competition, Graduate Design category, May 2015.
9. 2nd place at the *XVI PUC Exhibition Award - Innovations for a better life*, in the category Thesis and Dissertations for Graduate Students, July 2013.
10. 3rd place at the *MatLab and Simulink Student Design Challenge 2013*, international competition promoted by MathWorks, June 2013.
11. Academic Excellence Award, for having top 2% GPA amongst *PUC-Rio's* engineering undergraduate students, 2006, 2007 and 2008.

REVIWER SERVICE:

1. Reviewer for journals: AAAS Science Robotics; IEEE Transactions on Robotics (TRO); IEEE/ASME Transactions on Mechatronics (T-MECH); IEEE Robotics and Automation Magazine (RAM); IEEE Robotics and Automation Letters (RA-L); ASME Journal of Mechanical Design; ASME Journal of Dynamic Systems, Measurement and Control; IEEE Transactions on Learning Technologies (TLT); Elsevier Mechatronics; Robotica; Transactions of the Canadian Society for Mechanical Engineering.
2. Reviewer for conference proceedings: IEEE International Conference on Robotics and Automation (ICRA); IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS); Robotics: Science and Systems (RSS); IEEE International Conference on Soft Robotics (RoboSoft); IEEE-RAS 18th International Conference on Humanoid Robots (Humanoids); IEEE International Conference on Cybernetics and Intelligent Systems, and Robotics, Automation and Mechatronics (CIS-RAM); IEEE International Conference on Automation Science and Engineering (CASE); Annual Conference on Human-Robot Interaction (HRI).

SELECTED MEDIA COVERAGE:

1. Science Robotics manuscript covered by [Scientific American](#), [MIT Technology review](#), [Tech Crunch](#), [IEEE Spectrum](#), [MIT News](#), and more, 2019.
2. IEEE Spectrum "[Human Reflexes Help MIT's HERMES Rescue Robot Keep Its Footing](#)", 2019
3. Discovery and Science Channel, "BattleBots", [Season 4](#), 2019.
4. Discovery and Science Channel, "BattleBots", [Season 3](#), 2018.
5. ABC, "BattleBots" Season 2, 2017.
6. The Boston Globe, "[MIT building a robot without a mind of its own](#)", 2015.
7. MIT News: "[A biped robot with human reflexes](#)", 2015.
8. IEEE Spectrum: "[MIT Robot Steals Human Brains to Help it Balance](#)", 2015.
9. Cover of MIT MechE Connects: "[Robotics in the 21st Century - Building Robots for the People](#)", 2015.
10. Discovery Channel, "[RoboGames 2011 - Killer Robots](#)", 2011.

POSTDOCTORAL AND VISITING SCHOLARS:

1. Dr. Yeongtae Jung, Postdoctoral Research Associate, 2021-2022

GRADUATE ADVISING ACTIVITIES:

1. Youngwoo Sim, PhD Student, MechSE, UIUC
2. Guillermo Collin, PhD Student, MechSE, UIUC
3. Sunyu Wang, MS, Student, MechSE, UIUC
4. Kevin Murphy, MS Student, MechSE, UIUC
5. Marty Purushottam, MSc Student, ECE, UIUC
6. Yanran Ding (co-Advisor and Thesis Committee Chair), PhD Student, MechSE, UIUC
7. Yeonju Kim (co-Advisor), MS Student, MechSE, UIUC
8. Justin Yurkanin (co-Advisor), MS Student, MechSE, UIUC
9. Jiaming Zhang (co-Advisor), MS Student, MechSE, UIUC
10. Kevin Genehyub Gim (co-Advisor), PhD Student, MechSE, UIUC
11. Minkyung Kim (co-Advisor), PhD Student, MechSE, UIUC

UNDERGRADUATE ADVISING ACTIVITIES:

1. ME 497 - Independent Study advisor, Dillan Kenney and Peter Chien **Fall 2020, Spring 2021**
2. ECE 297 - Independent Study advisor: Design of a Low-cost Robotic Leg, Aaron De Los Santos **Spring 2021**
3. ME470 – Senior Design Project advisor: Kinematics and Compliance Rig for the Calibration of Racing Car Tires **Spring 2020**
4. Derrick Liu, undergraduate research advisor, MechSE, UIUC, 2020
5. Peter Chien, undergraduate researcher advisor, MechSE, UIUC, 2020
6. Anthony Stuart, BSc Thesis advisor, MIT, 2019
7. Alex Hattori, BSc Thesis advisor, MIT, 2019

LANGUAGES:

Portuguese (native), English (fluent), Italian (conversational).