João Luiz Almeida de Souza Ramos

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MechSE profile: https://mechanical.illinois.edu/directory/faculty/jlramos

EDUCATION:

PhD, Mechanical Engineering **2013 - 2018**
Massachusetts Institute of Technology (MIT), USA
Thesis: "*Humanoid Robot Dynamic Synchronization via Whole-Body Teleoperation with Bilateral Feedback*". 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

Illinois Summer Teaching Institute **2021**
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: "*Torque Control of an Exoskeleton Actuated by Pneumatic Artificial Muscles Using Electromyography Signals"*. Advisor: Marco A. Meggiolaro

Undergraduate Exchange 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: "*Simulation and Control with Kalman Filter of a Double Inverted Pendulum with Spinning Base".* Advisor: Marco A. Meggiolaro

ACADEMIC EXPERIENCE:

Assistant Professor, Dept of Mechanical Science and Eng. **August 2019 - present**
Director of the 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:

ME340 - Dynamics of Mechanical Systems **Fall 2021**
University of Illinois at Urbana-Champaign, USA

ME 446 – Robot Dynamics and Control, MechSE/ISE/ECE **Spring 2020, 2021, 2022**
University of Illinois at Urbana-Champaign, USA

ME 371 – Mechanical Design II, MechSE **Fall 2019**
University of Illinois at Urbana-Champaign, USA

ME470 – Senior Design Project **Spring 2020, Fall 2021**
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 for the 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems - IROS 2022
2. Associate Editor (Mechanisms, Design, and Control) for the 2021 IEEE International Conference on Robotics and Automation - ICRA 2021, ICRA 2022
3. Co-organizer of the "*Workshop on Teleoperation of Dynamic Legged Robots in Real Scenarios*", 2021 IEEE International Conference on Robotics and Automation (ICRA 2021)
4. Cohort for NSF CMMI's Game Changer Academies for Advancing Research Innovation, 2022
5. MAVIS Future Faculty Fellow mentor: Jiho Kim and Shabnam Bonyadi, 2019-2020
6. Illinois Robotics core faculty – Education Committee, 2019 – present
7. MechSE Seminar Committee, UIUC, 2019 – present

JOURNAL PUBLICATIONS:

1. K. Darvish, L. Penco, **J. Ramos**, R. Cisneros Limon J. Pratt, E. Yoshida, S. Ivaldi, D. Pucci, "*Teleoperation of Humanoid Robots: A Survey*", IEEE Transactions on Robotics (TRO), 2021 (under review)
2. S. Wang and **J. Ramos**, "*Dynamic Locomotion Teleoperation of a Reduced Model of a Wheeled Humanoid Robot Using a Whole-Body Human-Machine Interface*," in IEEE Robotics and Automation Letters, doi: 10.1109/LRA.2021.3138521. (presented at ICRA 2022).
3. **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.
4. **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).
5. **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 AND PRESENTATIONS:

1. Y. Jung, S. Wang, K. Murphy, A. Purushottam, and **J. Ramos**, "A Whole-Body Human-Machine Interface for Bilateral Teleoperation of Wheeled Humanoid Robots", Workshop on Human-like Behavior and Cognition in Robots, IEEE/RSJ IROS 2021 (**Best Poster Award**)
2. Song, S.Y., Xiao, C., Chen, Y., **Ramos, J.**, Hsiao-Wecksler, E.T. "*Hands-free Interface for a Self-balancing Omnidirectional Riding Ballbot*," 45th American Society of Biomechanics Annual Meeting (virtual), Atlanta, GA, August 10-13, 2021.

3. **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.
4. 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.
5. 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.
6. **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.
7. **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.
8. **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.
9. **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.
10. 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.
11. **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.
12. **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 Biomechatronics (BioRob 2014), Sao Paulo, Brazil, August 12-15, 2014.
13. **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.
14. **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.
15. **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.
16. **Joao Luiz A. S. Ramos**, and Marco A. Meggiolaro, "*Drum Shape Design and Optimization*

using Genetic Algorithms", Robogames Scientific Symposium, San Mateo, CA, 2012.
17. **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.
18. 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.
19. 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.
20. 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. Department Head's Distinguished Seminar, Industrial & Enterprise Systems Engineering, University of Illinois at Urbana-Champaign, November 2021.
2. Seminar at the VIII Physics Engineering Week (VIII SEMEF), University of Sao Paulo, September 2021.
3. Seminar at the Biomimetics and Dexterous Manipulation Lab, Stanford, August 2021.
4. IEEE International Electric Machines and Drives Conference (IEMDC), invited panelist on Robotics and Automation, May 2021.
5. Semiautonomous Seminar Series, University of California, Berkeley, November 2020.
6. Workshop on Multidisciplinary Approaches to Advance Physical Human-Robot Interaction, IEEE International Conference on Robotics and Automation (ICRA), Paris, 2020.
7. Workshop on Teleoperation of Humanoid Robots, IEEE International Conference on Humanoid Robots (Humanoids), Toronto, 2019.
8. Illinois Robotics Seminar Series, Coordinated Science Lab (CSL), October 2019.
9. Dep. of Mechanical Engineering Seminar Series, University of Minnesota Twin-Cities, March 2019.
10. Dep. of Mechanical Engineering Seminar Series, University of Delaware, March 2019.
11. Dep. of Mechanical and Industrial Engineering Seminar Series, University of Massachusetts Amherst, February 2019.
12. Dep. of Mechanical Science and Engineering Seminar Series, University of Illinois at Urbana-Champaign, January 2019.
13. Disney Research Los Angeles, CA, July 2018.
14. "*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.
15. "*The MIT HERMES Project: A System for Bilateral Feedback Teleoperation and Disaster Response*", Robotics and Controls Seminar, Concordia University, Montreal, Canada,

November 2015.

16. "*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 (ME340 Dynamics of Mechanical Systems), top student evaluation on the *Instructor and Course Evaluation System (ICES)*, UIUC, Fall 2021.
3. List of Teachers Ranked as Excellent (ME446 Robot Dynamics and Control), top student evaluation on the *Instructor and Course Evaluation System (ICES)*, UIUC, Spring 2021.
4. *Science without Borders*, full 4-years doctorate fellowship, 2013 (declined).
5. *National Council for Scientific and Technological Development (CNPq)*, full 2-years MSc fellowship, 2011.
6. 3rd place at the MIT Alumni Research Slam, December 2020.
7. 3rd place at the *2018 MIT Mechanical Engineering de Florez Award* competition, Graduate Design category, May 2018.
8. 2nd place at *UAE AI & Robotics for Good Award*, competing with 664 teams from 121 countries, Dubai, UAE, February 2016.
9. 2nd place at the *2015 MIT Mechanical Engineering de Florez Award* competition, Graduate Design category, May 2015.
10. 2nd place at the *XVI PUC Exhibition Award - Innovations for a better life*, in the category Thesis and Dissertations for Graduate Students, July 2013.
11. 3rd place at the *MatLab and Simulink Student Design Challenge 2013*, international competition promoted by MathWorks, June 2013.
12. Academic Excellence Award, for having top 2% GPA amongst *PUC-Rio's* engineering undergraduate students, 2006, 2007 and 2008.

REVIEWER AND CHAIR SERVICE:

1. Reviewer for journals: AAAS Science Robotics; Nature Machine Intelligence; 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 Control of Network Systems (TCNS); 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); International Conference on Social Robotics (ICSR).
3. Session Chair for: "Humanoid Robots" at ICRA 2021; "Robotic Systems and Benchmarking I" at IROS 2021.

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.

POSDOCTORAL AND VISITING SCHOLARS:

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

CURRENT GRADUATE ADVISING ACTIVITIES:

1. Youngwoo Sim, PhD Student, MechSE, UIUC
2. Guillermo Collin, PhD Student, MechSE, UIUC
3. Donghoon Baek, PhD Student, MechSE, UIUC
4. Kevin Murphy, MS Student, MechSE, UIUC
5. Marty Purushottam, MS Student, ECE, UIUC
6. Chenzhang Xiao (co-Advisor), PhD Student, MechSE, UIUC
7. Seung Yun Song (co-Advisor), PhD Student, MechSE, UIUC
8. Benjamin Thomas Walt (co-Advisor), PhD Student, MechSE, UIUC
9. Justin Yurkanin (co-Advisor), MS Student, MechSE, UIUC
10. Jiaming Zhang (co-Advisor), MS Student, MechSE, UIUC
11. Kevin Genehyub Gim (co-Advisor), PhD Student, MechSE, UIUC
12. Minkyung Kim (co-Advisor), PhD Student, MechSE, UIUC
13. Daniel Panno, ME597- Independent Study (Non-thesis Master's Project), UIUC, Fall 2021

PREVIOUS GRADUATE ADVISING ACTIVITIES:

1. Sunyu Wang, MS August 2021, MechSE, UIUC
2. Yeonju Kim (co-Advisor), MS June 2021, MechSE, UIUC
3. Yanran Ding (co-Advisor and Thesis Committee Chair), PhD March 2021, MechSE, UIUC

PHD THESIS COMMITTEE:

1. Chuanzheng Li, MechSE, UIUC
2. Seung Yun Song, MechSE, UIUC
3. Jaejun Park, MechSE, UIUC

UNDERGRADUATE ADVISING ACTIVITIES:

1. Michaela Horn, Semiconductor Research Corporation Undergraduate Research Program, UIUC, Fall 2021 and Spring 2022
2. Ethan Moore, ME297 - Independent Study advisor: Water Quality Profiling with and Autonomous Surface Vehicle, Research Support Grant sponsored by the Office of Undergraduate Research, UIUC, Fall 2021, Spring 2022
3. Johnny Chang, ECE396/307 - Honors Project advisor: Control of Humanoid Robots using Bilateral Teleoperation, UIUC, Fall 2021, Spring 2022

4. Aaron De Los Santos, ECE 297 - Independent Study advisor: Design of a Low-cost Robotic Leg, UIUC, Spring 2021
5. Dillan Kenney, ME 497 - Independent Study advisor: Design of a full-body human-machine interface, UIUC, Fall 2020 - Spring 2021
6. Derrick Liu, undergraduate research advisor, MechSE, UIUC, 2020
7. Peter Chien, undergraduate research advisor, MechSE, UIUC, 2020
8. Anthony Stuart, BSc Thesis advisor, MIT, 2019
9. Alex Hattori, BSc Thesis advisor, MIT, 2019

LANGUAGES:

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