

# Ricardo Vilela de Godoy

PHD MECHATRONICS ENGINEER · POSTDOC RESEARCHER

São Carlos, Brazil

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## Summary

I am a robotics researcher focused on **Physical AI**, integrating learning-enabled robot capabilities into real-world **inspection, automation**, and **assistive** frameworks. I am currently a Postdoctoral Researcher at the University of São Paulo (USP), working on the development of robotic frameworks for inspection and automation, with an emphasis on **manipulation and loco-manipulation**. I received my PhD at the University of Auckland, where I developed **human–robot interfaces and shared-control** methods to combine **biosignals** (e.g., EMG) and **wearable devices** with external sensing (e.g., **motion capture and vision**) to decode discrete and continuous human motion for intuitive **control of robotic and prosthetic** devices. During my MSc at USP, I worked on **EEG-based epileptic seizure prediction**. My primary interest lies in robotics, sensing, and learning, with the goal of developing systems that are **robust for real-time control in real-world settings** across **industrial, medical, and daily-life applications**.

## Professional Experience

### University of São Paulo

POSTDOCTORAL RESEARCH FELLOW

- Mechatronics engineer working on the development of robotic frameworks for inspection and maintenance in oil platforms
- Technical leader of a team of 30-50 members and experienced in arranging international collaborations between universities
- Research in robotics, locomanipulation frameworks, and machine learning applications

📍 São Carlos, Brazil

📅 Sep. 2024 - Present

### Faculty of Health Sciences, Albert Einstein Hospital

ASSISTANT PROFESSOR

- Assistant professor in the Biomedical Engineering Bachelor program and in the Postgraduate Degree in Bioengineering Applied to Health.

📍 São Paulo, Brazil

📅 Jan. 2025 - Jul. 2025

### New Dexterity Research Group, The University of Auckland

GRADUATE RESEARCH ASSOCIATE

- Mechatronics engineer working on the development of novel human-machine interfaces solutions
- Development of novel bionic devices and deep learning algorithms

📍 Auckland, New Zealand

📅 Dec. 2021 - Aug. 2024

### RESEARCH ASSOCIATE - COLLABORATION WITH ACUMINO (USA), PART-TIME

📅 Dec. 2021 - Aug. 2024

- Data collection and analysis of grasping and manipulation strategies using wearable human machine interfaces
- Development of machine learning-based algorithms for automated annotation of videos

### RESEARCH ASSOCIATE - COLLABORATION WITH PROWOOD LIMITED (NZ), PART-TIME

📅 Sep. 2022 - Mar. 2023

- Funded by the 2022/23 R&D Experience Grants from Callaghan Innovation New Zealand's Innovation Agency
- Development of an automated framework for assembling beehive frames

### University of São Paulo

GRADUATE RESEARCH ASSOCIATE

- Mechatronics engineer working on the development of novel deep learning and deep reinforcement learning techniques
- Member of the robotics surgery group
- Research in neurology, epilepsy, machine learning, and brain-machine interface

📍 São Carlos, Brazil

📅 Jul. 2019 - Jul. 2021

### University of São Paulo

UNDERGRADUATE RESEARCHER - FUNDAÇÃO DE APOIO À FÍSICA E À QUÍMICA (FAFQ)

📍 São Carlos, Brazil

📅 Jul. 2016 - Dec. 2019

- Engineering undergraduate researcher responsible for the development and implementation of an algorithm based on Dynamic Movement Primitives in a robotic arm. I also worked on the simulation of the autonomous vehicle using V-REP and ROS

### MULTITECH Engineering

ENGINEERING INTERN

- Intern in the modelling and simulation of dynamic systems group

📍 São Carlos, Brazil

📅 Jan. 2019 - Jul. 2019

## Education

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### The University of Auckland

PHD IN MECHANICAL AND MECHATRONICS ENGINEERING

📍 Auckland, New Zealand

📅 Dec. 2021 - Aug. 2024

- Thesis on analysis and development of novel human-machine interfaces for the control of bionic devices
- Research in robotics, human-machine interfaces, and machine learning techniques

### University of São Paulo

MASTER IN MECHANICAL ENGINEERING

📍 São Carlos, Brazil

📅 Jan. 2020 - Jul. 2021

- Thesis Title: Epileptic Seizure Prediction using Deep Learning Techniques
- Research in machine learning techniques, brain-computer interfaces, neuroscience, neuroimaging, and robotics

### University of São Paulo

BACHELOR IN MECHATRONICS ENGINEERING

📍 São Carlos, Brazil

📅 Feb. 2015 - Dec. 2019

- Senior Thesis Title: Comparison of Deep Reinforcement Learning Control Methods of Autonomous Robot in a Competition Task

## Honors and Awards

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2025 **Best Paper Award**, IEEE Latin American Robotics Symposium (LARS 2025)

Monterrey, Mexico

2009-2014 **1 gold medal, 2 bronze medals, and 1 honorable mention**, Paulista Physics Olympiad (OPF)

Brazil

2007-2014 **1 gold medal and 6 silver medals**, Brazilian Astronomy Olympiad (OBA)

Brazil

2011 **Honorable mention**, Brazilian Physics Olympiad (OBF)

Brazil

2010 **Gold medal**, Brazilian Robotics Olympiad (OBR)

Brazil

## Teaching Experience

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### Assistant Professor - Faculty of Health Sciences, Albert Einstein Hospital

📍 São Paulo, Brazil

📅 2025

SPECIALIZATION: POSTGRADUATE DEGREE IN BIOENGINEERING APPLIED TO HEALTH

- Emphasized a multidisciplinary, technology-driven approach to tackling complex healthcare challenges
- Focus on development of machine learning-based projects, applied electrical circuits and electronics, and signal processing

COURSE: PROCESSING OF MEDICAL SIGNALS AND IMAGES

📅 2025

- Course taught for the Biomedical Engineering Bachelor's program
- Biosignal physiology and signal/image processing for medicine and robotics applications
- Reinforced concepts with hands-on Python labs using core scientific libraries

### Graduate Teaching Assistant - The University of Auckland

📍 Auckland, New Zealand

📅 2022-2024

MECHENG 730/736: BIOMECHATRONICS SYSTEMS

- Explore mechatronic principles and techniques for measuring and manipulating biological systems
- Design of biomechatronics systems, human biomechanics, and motion control

MECHENG 700: PART IV (FINAL YEAR) RESEARCH PROJECT

📅 2022-2024

- Development of research projects on a topic of interest for Mechanical and Mechatronics Engineers

## Skills

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### Programming

Python, Matlab, C/C++, C#, ROS, Git, Tensorflow, PyTorch, Keras, Scikit, OpenCV

### Simulation Frameworks

MuJoCo, Gazebo, IsaacSim, IsaacLab, Rviz, Unity

### Languages

Portuguese (native), English (fluent), German (basic)

Robotics, human-machine interfaces, deep learning, deep reinforcement learning, cloud computing services, biosignal analysis, wearable sensors, automation, motion capture systems, human-robotic interaction, teaching, supervising

# Workshops, Tutorials, and Talks

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## IEEE International Conference on Advanced Robotics (ICAR)

WORKSHOP ORGANIZER: ROBOTIC FAULT-DETECTION STRATEGIES FOR COMPLEX INDUSTRIAL CONTEXTS

📍 San Juan, Argentina

📅 Dec. 2025

## University of São Paulo

INVITED TALK: DEVELOPMENT OF HUMAN-MACHINE INTERFACES FOR THE TELEOPERATION CONTROL OF ROBOTIC MANIPULATORS

📍 São Carlos, Brazil

📅 Jun. 2025

## Hospital Albert Einstein

INVITED TALK: HUMAN-MACHINE INTERFACES: APPLICATIONS OF BIOLOGICAL SIGNALS IN ROBOTICS

📍 São Paulo, Brazil

📅 Aug. 2024

## University of Waikato

INVITED TALK: ANALYSIS AND DEVELOPMENT OF HUMAN-MACHINE INTERFACES FOR THE CONTROL OF ROBOTIC AND BIONIC DEVICES

📍 Hamilton, New Zealand

📅 Jan. 2024

## IEEE International Conference on Automation Science and Engineering (CASE)

TUTORIAL: BIOSIGNAL-BASED DESIGN APPROACHES FOR THE DEVELOPMENT OF HUMAN-MACHINE INTERFACES FOR SHARED CONTROL OF COMPUTER APPLICATIONS AND ROBOTIC DEVICES

📍 Auckland, New Zealand

📅 Aug. 2023

- Tutorial focused on approaches for development of interfaces that facilitate intuitive interactions with different devices
- Different types of biosignals and associated analytical methods, machine learning and deep learning methods were discussed

# Service

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## Peer reviewer

📍 International

### JOURNALS

📅 2020 - Today

- Nature Portfolio: Scientific Reports, npj Robotics
- IEEE Robotics and Automation Letters (RA-L), IEEE Journal of Biomedical and Health Informatics, IEEE Access
- Elsevier: Neural Networks, Computers in Biology and Medicine, Computational and Structural Biotechnology Journal, Journal on Multimodal User Interfaces
- Springer Nature: Archives of Computational Methods in Engineering, Journal of Bionic Engineering, Journal of NeuroEngineering and Rehabilitation, Journal of Medical Systems, Journal of Intelligent & Robotic Systems, Signal Image and Video Processing, Discover Artificial Intelligence, Journal of Machine Learning and Cybernetics, Pattern Analysis and Applications
- Frontiers in Virtual Reality

### CONFERENCES

📅 2020 - Today

- IEEE International Conference on Intelligent Robots and Systems (IROS)
- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE Conference on Biomedical Robotics and Biomechatronics (BioRob)
- IEEE International Conference on Advanced Robotics (ICAR)
- IEEE Latin American Robotics Symposium (LARS)

## The University of Auckland

LIAISON OF THE MECHATRONICS LABORATORY AT THE UNIVERSITY OF AUCKLAND

📍 Auckland, New Zealand

📅 2023 - 2024

## IEEE International Conference on Automation Science and Engineering (CASE)

VOLUNTEER AT THE 2023 INTERNATIONAL CONFERENCE ON AUTOMATION SCIENCE AND ENGINEERING

📍 Auckland, New Zealand

📅 Aug. 2023

## Museum of Transport and Technology Auckland (MOTAT) Stem Fair 2023

📍 Auckland, New Zealand

📅 Apr. 2023

SPECIALIST EXHIBITOR AT THE 2023 MOTAT STEM FAIR

- Demonstrations and displays of my research to engage the next generation of kids to consider careers in STEM

## 2022 Conference on Robot Learning

AUDIO VISUAL EQUIPMENT CHAIR AT THE 2022 CONFERENCE ON ROBOT LEARNING

📍 Auckland, New Zealand

📅 Dec. 2022

## 2022 World Robot Olympiad

JUDGE IN THE 1ST NEW ZEALAND FINALS OF THE WORLD ROBOT OLYMPIAD

📍 Auckland, New Zealand

📅 Oct. 2022

## IEEE-RAS Student Chapter

CO-FOUNDER AND VICE PRESIDENT OF THE RAS CHAPTER AT THE UNIVERSITY OF SAO PAULO

📍 São Carlos, Brazil

📅 2019 - 2021

# Publications

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## Journal Publications

B. Guan, Z. Wang, **R. V. Godoy**, M. Owen, and M. Liarokapis, "Combining Augmented Reality with Semi-autonomous, Lightmyography Based Control to Improve Usability of Prostheses", in *IEEE Access*, 2025 (under review).

B. Guan, **R. V. Godoy**, and M. Liarokapis, "On the Impact of Different Light Wavelengths in Decoding Grip Forces for Lightmyography Controlled Prosthetic Hands", in *IEEE Access*, 2025 (under review).

J. M. H. Pinheiro, S. V. B. de Oliveira, T. H. Segreto, P. A. R. Saraiva, E. F. de Souza, **R. V. Godoy**, L. A. Ambrosio, and M. Becker, "The Impact of Feature Scaling In Machine Learning: Effects on Regression and Classification Tasks", in *IEEE Access*, 2025.

B. Guan, **R. V. Godoy**, M. Shahmohammadi, A. Dwivedi, and M. Liarokapis, "Offline Versus Real-Time Grasp Prediction Employing a Wearable High-Density Lightmyography Armband: On the Control of Prosthetic Hands", in *IEEE Access*, 2025.

J. Buzzatto, H. Jiang, J. Liang, B. Busby, A. Lynch, **R. V. Godoy**, S. Matsunaga, R. Haraguchi, T. Mariyama, B. A. Macdonald, M. Liarokapis, "Multi-Layer, Sensorised Kirigami Grippers for Delicate yet Robust Robot Grasping and Single-Grasp Object Identification", in *IEEE Access*, 2024.

**R. V. Godoy**, B. Guan, F. Sanches, A. Dwivedi and M. Liarokapis, "Electromyography Based Gesture Decoding Employing Few-Shot Learning, Transfer Learning, and Training From Scratch", in *IEEE Access*, 2023.

M. Shahmohammadi, B. Guan, **R. V. Godoy**, A. Dwivedi, P. Nielsen, and M. Liarokapis, "On lightmyography based muscle-machine interfaces for the efficient decoding of human gestures and forces", in *Nature Scientific Reports*, 2023.

**R. V. Godoy** et al., "Electromyography-Based, Robust Hand Motion Classification Employing Temporal Multi-Channel Vision Transformers", in *IEEE Robotics and Automation Letters (RA-L)*, 2022.

**R. V. Godoy**, A. Dwivedi and M. Liarokapis, "Electromyography Based Decoding of Dexterous, In-Hand Manipulation Motions With Temporal Multichannel Vision Transformers", in *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 2022.

**R. V. Godoy** et al., "On EMG Based Dexterous Robotic Telemanipulation: Assessing Machine Learning Techniques, Feature Extraction Methods, and Shared Control Schemes", in *IEEE Access*, 2022.

## Conference Publications

B. Guan, **R. V. Godoy**, A. Dwivedi, and M. Liarokapis, "On the Impact of Different Light Wavelengths in Decoding Human Intention in Lightmyography Controlled Prosthetic Hands", in 47th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), 2025.

B. Guan, M. Kobayashi, **R. V. Godoy**, M. Owen, and M. Liarokapis, "On Semi-Autonomous, Intuitive, Lightmyography Based Control of Humanlike Robotic and Prosthetic Hands Utilizing Video and IMU Data", in *IEEE International Conference on BioInformatics and BioEngineering (BIBE)*, 2025.

R. R. Baptista, N. R. Gerszberg, **R. V. Godoy**, and G. J. G. Lahr, "MIHRaGe: A Mixed-Reality Interface for Human-Robot Interaction via Gaze-Oriented Control", in *IEEE International Conference on Advanced Robotics (ICAR)*, 2025.

M. V. da Silva, M. H. Carvalho, J. Negri, T. H. Segreto, **R. V. Godoy**, and M. Becker, "A Vision-Based Shared-Control Teleoperation Scheme for Controlling the Robotic Arm of a Four-Legged Robot", **awarded the best paper** in the *IEEE Latin American Robotics Symposium (LARS)*, 2025.

M. S. Tayar, L. K. de Oliveira, J. Negri, T. H. Segreto, **R. V. Godoy**, and M. Becker, "Autonomous UAV Flight Navigation in Confined Spaces: A Reinforcement Learning Approach", in *IEEE Latin American Robotics Symposium (LARS)*, 2025.

P. Saraiva, E. Ferreira, J. Pinheiro, T. H. Segreto, **R. V. Godoy**, and M. Becker, "A Synthetic Dataset for Manometry Recognition in Robotic Applications", in *IEEE Latin American Robotics Symposium (LARS)*, 2025.

D. Almeida, G. Lazzarini, J. Negri, T. H. Segreto, **R. V. Godoy**, and M. Becker, "Optimizing Grasping in Legged Robots: A Deep Learning Approach to Loco-Manipulation", in *IEEE Latin American Robotics Symposium (LARS)*, 2025.

**R. V. Godoy**, B. Guan, A. Dwivedi, M. Owen, and M. Liarokapis, "A Video Dataset of Everyday Life Grasps for the Training of Shared Control Operation Models for Myoelectric Prosthetic Hands", in *International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2024.

**R. V. Godoy**, B. Guan, A. Dwivedi, and M. Liarokapis, "An Affordances and Electromyography Based Telemanipulation Framework for Control of Robotic Arm-Hand Systems", in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2023.

**R. V. Godoy**, B. Guan, A. Dwivedi, M. Shahmohammadi, M. Owen, and M. Liarokapis, "Multi-Grasp Classification for the Control of Robot Hands Employing Transformers and Lightmyography Signals", in *International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2023.

B. Guan, **R. V. Godoy**, F. Sanches, A. Dwivedi, and M. Liarokapis, "On Semi-Autonomous Robotic Telemanipulation Employing Electromyography Based Motion Decoding and Potential Fields", in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2023.

M. Shahmohammadi, B. Guan, **R. V. Godoy**, and M. Liarokapis, "An Adaptive, Humanlike Prosthetic Hand Equipped with a Series Elastic Differential and a Lightmyography Based Control Interface", in *IEEE International Conference on Automation Science and Engineering (CASE)*, 2023.

B. Guan, **R. V. Godoy**, F. Sanches, A. Dwivedi, Y. Kwon, and M. Liarokapis, "Electromyography and Potential Fields Based Shared Control Framework for Robotic Telemanipulation", in *IEEE International Conference on Robotics and Automation (ICRA)*, 2023.

N. Elangovan, **R. V. Godoy**, F. Sanches, K. Wang, T. White, P. Jarvis, and M. Liarokapis, "On Human Grasping and Manipulation in Kitchens: Automated Annotation, Insights, and Metrics for Effective Data Collection", in *IEEE International Conference on Robotics and Automation (ICRA)*, 2023.

J. Liang, J. Buzzatto, B. Busby, **R. V. Godoy**, S. Matsunaga, R. Haraguchi, T. Mariyama, B. Macdonald, M. Liarokapis, "Employing Multi-Layer, Sensorised Kirigami Grippers for Single-Grasp Based Identification of Objects and Force Exertion Estimation", in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2023.

F. Sanches, G. Gao, N. Elangovan, **R. V. Godoy**, J. Chapman, K. Wang, P. Jarvis, M. Liarokapis, "Scalable, Intuitive Human to Robot Skill Transfer with Wearable Human Machine Interfaces: On Complex, Dexterous Tasks", in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2023.

**R. V. Godoy** et al., "Electromyography-Based, Robust Hand Motion Classification Employing Temporal Multi-Channel Vision Transformers", in *IEEE RAS/EMBS International Conference for Biomedical Robotics and Biomechatronics (BioRob)*, 2022.

**R. V. Godoy**, A. Dwivedi, M. Shahmohammadi and M. Liarokapis, "Lightmyography Based Decoding of Human Intention Using Temporal Multi-Channel Transformers", in *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2022.

N. Elangovan, C. Chang, **R. V. Godoy**, F. Sanches, K. Wang, P. Jarvis, and M. Liarokapis, "Comparing Human and Robot Performance in the Execution of Kitchen Tasks: Evaluating Grasping and Dexterous Manipulation Skills", in *IEEE-RAS International Conference on Humanoid Robots (Humanoids)*, 2022.

**R. V. Godoy** et al., "Redundant Robot Kinematics Error Analysis for Neurosurgical Procedures", in *IEEE International Conference on Industry Applications (INDUSCON)*, 2021.

L. A. Marão, L. Casteluci, **R. V. Godoy**, H. Garcia, D. V. Magalhães and G. Caurin, "Deep Reinforcement Learning Control of an Autonomous Wheeled Robot in a Challenge Task: Combined Visual and Dynamics Sensoring", in *International Conference on Advanced Robotics (ICAR)*, 2019.

## Preprint Publications

T.H. Segreto, J. Negri, P. H. Polegato, J. M. H. Pinheiro, **R. V. Godoy**, and M. Becker, "A Leaf-Level Dataset for Soybean-Cotton Detection and Segmentation", in ArXiV, 2025.

G. J. Lahr, **R. V. Godoy**, T. H. Segreto, J. O. Savazzi, A. Ajoudani, T. Boaventura, and G. A. Caurin, "Improving Failure Prediction in Aircraft Fastener Assembly Using Synthetic Data in Imbalanced Datasets", in ArXiv, 2025.

**R. V. Godoy** et al., "EEG-Based Epileptic Seizure Prediction Using Temporal Multi-Channel Transformers", in ArXiv, 2022.