Jorge I. Vásquez

Curriculum Vitae

Carnegie Mellon University, Pittsburgh, PA, USA
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Profile

Experienced Systems Engineer with a forthcoming Ph.D. in Mechanical Engineering (May 2024), specializing in deep learning, computer vision, and reinforcement learning. Skilled in product design and integration, software development, and engineering analysis. Expertise in machine vision and robotic inspection systems to improve real-world and simulation performance. Experienced in leading cross-functional projects, analyzing extensive datasets, and fostering technical consensus. Excited to contribute to the advancement of autonomous systems safety. Proficient in Python and C++.

Education

2019–2024 **Ph.D. in Mechanical Engineering**, *Carnegie Mellon University*, Pittsburgh, PA, USA, *GPA: 4.00/4.00*

2012–2014 **MSc in Mechanical Engineering**, *Carnegie Mellon University*, Pittsburgh, PA, USA, *GPA: 3.56/4.00*

2013–2014 **MSc in Computational Design**, *Carnegie Mellon University*, Pittsburgh, PA, USA, *GPA: 3.46/4.00*

2014–2018 **BS in Mechanical Engineering**, *University of Santiago*, Santiago, Chile, *Best 5%*

2006–2010 **BS in Systems Engineering**, *Military Polytechnic Academy*, Santiago, Chile, *Magna Cum Laude*

Teaching Experience

2021–Present **Adjunct Professor**, *Universidad Adolfo Ibañez*, Santiago, Chile
- Introduction of Reinforcement Learning (Master of Artificial Intelligence)
- Electronics Interfaces (Master of Science in Design)

2020–2022 **Teaching Assistant**, *Carnegie Mellon University*, Pittsburgh, PA, USA
- Mechatronics Design
- Engineering Design

2020–2022 **Lecturer**, *University of Santiago*, Santiago, Chile
- Introduction to Robotics

2014–2018 **Lecturer**, *Military Polytechnic Academy*, Santiago, Chile
- Introduction to Artificial Intelligence (2017)
- Systems Design (2018)
- Mechanics of Materials TA (2014)

2014–2015 **Lecturer**, *Pontifical Catholic University of Chile*, Santiago, Chile
- Solid Mechanics

Professional Experience

2019–2024 **Ph.D. Researcher in Computer Vision/ML/Robotics**, *Carnegie Mellon University*, Pittsburgh, PA, USA

- Developing Enhanced Deep Learning Defect Detection Methods for Mobile Robot Quality Inspection
- Designing Model-Based Systems Engineering Methods for architecting robotic systems
- Developing Reinforcement Learning Methods for Legged Robots
- Mentored more than 30 master students in computer vision, robotics, systems design, and deep learning
- Teaching Assistant in Mechatronics Design and Engineering Design Course

2020–2021 **Systems Lead**, *Robotics Institute*, Pittsburgh, PA, USA

- Led the system integration of software, mechanical, power, thermal, and data teams in a NASA-funded project
- Designing novel safety Model-Based System Engineering (MBSE) methods for small and low-budget mobile robotic systems

2017–2019 **Director of Modeling and Simulation Center**, *Chilean Army*, Chile

- Directed a Research and Development Center with more than 20 engineers, physicists, scientists, and staff with a budget over $2M
- Led a digital transformation for the Chilean Army based on Simulation Technology
- Led Mechanical, Software, and Electrical Teams using Model-Based Systems Engineering for Product Design purposes

2015–Present **Consultant and Serial Entrepeneur**, *Remote*, https://vascolab.ai/

- Director at GAIA (2022-Present): Designed and developed Machine Learning-based models (MLOps) in various Chilean companies, from UAV-based inspection to FinTech Companies
- Director at Musk Spa (2017-2022): Designed and developed collaborative Apps, APIs, and Web platforms for more than 10 Chilean companies
- CTO, Befitness (2015-2017): Led tech at a CORFO-awarded startup connecting trainers and clients in Santiago

2014–2017 **Project Manager in Modeling and Simulation Center**, *Chilean Army*, Chile

- Led the design and development of a National Safety Simulator (2017-2019)
- Led the design and development of the Army Simulation System (2017-2018)
- Led more than ten small research projects for the Chilean Army in robotics and simulation
- Led the design and development of the Virtual Shooting Range ($1M, 2014-2016)

2012–2014 **Research Assistant**, *Carnegie Mellon University*, Pittsburgh, PA, USA

- Developed a bionic prosthesis for disabled people
- Developed a robotic Jenga player using computer vision
- Designed a path planning method for UAVs in emergencies

Research

1. J. Vásquez, T. Furuhata, K. Shimada, "Image Enhanced Unet: Optimizing Defect Detection in Window Frames for Construction Quality Inspection," *Buildings Journal*, MDPI, 2023. Published.
2. I. Dassori, M. Adams, J. Vásquez, "Advancing Four-Legged Quality Inspection on Construction Sites through the Fusion of Computer Vision and Reinforcement Learning," *27th International Conference of Information Fusion*, IEEEXplore proceedings, 2024. Accepted.
3. J. Vásquez, T. Furuhata, K. Shimada, "Advancing Defect Segmentation in Complex Scenarios using a Model-Based Quality Assessment Functions and an Image Enhancement Strategy," *Journal of Building Engineering*. In progress.

4. J. Vásquez, T. Furuhata, K. Shimada, "Enhancing Autonomous Legged Robotic Inspection using BIM-based Segmentation," *Automation in Construction*. In progress.

Other Publications

1. J. Vásquez, "Comparative Analysis of Model-Based Systems Engineering Approach to a Traditional Approach for Architecting a Low-Budget Robotic Space Systems," *Journal of Systems Engineering*. In progress.
2. J. Vásquez, "Networked Organizational Simulation Systems for Technological Management in Military Institutions," *Colombia Army Journal*, 2021.
3. J. Vásquez, "Book: Virtual Army: Challenges of the Simulation Technology in the Chilean Army," *Chilean Army Journal*, 2020.
4. S. Kumar, D. Shu, K. Vazquez-Santiago, J. Vásquez, "A Comparison of Machine Learning Methods for Predicting Final Vehicle Destinations," *Poster Conference*, 2018.
5. J. Vásquez, "Design and Development of an Emergency Simulator for Disaster Management," *Chilean College of Engineering*, 2017.
6. J. Vásquez, "Design and Development of a Virtual Shooting Range," *Chilean College of Engineering*, 2016.

Technical Skills

Programming Languages	Python, C++, Matlab
Languages	English (Full Proficiency) and Spanish (Native)