

# Héctor Villeda

## Contact

E-mail: [Hecvilleda@gmail.com](mailto:Hecvilleda@gmail.com)

Personal Website: [www.hecvilleda.com](http://www.hecvilleda.com)

Phone: + 43 681 84684445

## EDUCATION

---

Innsbruck, Austria 2019-2023(May)      **PhD. in Computer Science**  
University of Innsbruck, OLIVER Project. Open-Ended Learning for Interactive Robots (EUREGIO IPN, 2019-2022)

México 2012-2014      **MSc. Robotics and Advanced Manufacturing**  
Center for research and advanced studies of the national polytechnic institute (CINVESTAV)

México 2006-2010      **B.Eng., Mechatronics.**  
Universidad Politécnica de Pachuca, México. 2011.

## AWARDS

---

- Finalist at Science Park Graz Idea Competition 2024 (LearnIX Robotics)
- Featured in VISION Magazine #9 as a successful ex-student of DGETI, Mexico [[Link](#)]
- Winner at IDEATHON 2023. Future of mobility [Link](#)
- Best poster award. Austrian Robotics Workshop. June 2022.
- Scholarship to study the master in robotics at CINVESTAV, (2012-2014).
- Selected for the student exchange program with Benemérita Universidad Autónoma de Puebla (BUAP). (October 2010-April 2011)

## LANGUAGE

---

- English
- Spanish

## EXPERIENCE

---

**Robotics & A.I.:** Multi-robot coordination control, Neural Networks, Time-series analysis, mobile robots, arm robots, Quadratic Optimization, Programming by Demonstrations, CNN, Autoencoders, Regression models, Autonomous

navigation control, machine learning, path planning, nonlinear control, Robotic tasks generalization, Gaussian Mixture Models, PCA, Bayesian Optimization, Gaussian Process Regression.

**Programming:** Python, C++, Matlab

**Libraries:** TensorFlow, Keras (API), OpenCV.

**Frameworks:** ROS

**Industrial:** FANUC, COGNEX, UR, FRANKA,

**Software:** LabVIEW, SolidWorks, Latex

## PUBLICATIONS

---

### Journal Papers

- Héctor Pérez-Villeda, Justus Piater, Matteo Saveriano, **Learning and Extrapolation of Robotic Skills using Task-Parameterized Equation Learner Networks**. Accepted to: Robotics and Autonomous Systems. ISSN 0921-8890, DOI: 10.1016/j.robot.2022.104309. [[Pdf](#)] and [[video](#)]
- Héctor M. Pérez-Villeda, Gustavo Arechavaleta, América Morales-Díaz, **Multi-vehicle coordination based on hierarchical quadratic programming**, Control Engineering Practice, Volume 94, 2020, 104206, ISSN 0967-0661, [[Pdf](#)] and [[video](#)]
- Gustavo Arechavaleta, América Morales-Díaz, Héctor M. Pérez Villeda, Mario Castelán, **Hierarchical Task-Based Control of Multi-robot Systems With Terminal Attractors**, IEEE Transactions on Control Systems Technology, 1063-6536, 2016, DOI: 10.1109/TCST.2016.2549279. [[Pdf](#)] and [[video](#)]

### International Conferences

- **Best Poster Award**, Héctor M. Pérez Villeda, Justus Piater, Matteo Saveriano, **Trajectory Adaptation from Demonstrations with Constrained Optimization**, Austrian Robotics Workshop, 2022. [[Poster](#)] and [[Paper](#)]
- Héctor M. Pérez Villeda, América Morales Díaz, Flabio Mirelez Delgado. **Feasible trajectories generation for formation of mobile robots and obstacle avoidance using PRM and Dijkstra algorithms**. Latin American Congress of Automatic Control (CLCA), 2014, Cancún Quintana Roo, México. [[Pdf](#)] and [[video](#)]

## Domestic Conferences

- Lotta Lumiaro, Clemens Mahlbacher, Hector Perez-Villeda, **Automatic Extrinsic LiDAR-IMU Calibration for Autonomous Ground Vehicles**, Austrian Robotics Workshop, 2024
- Héctor M. Pérez Villeda, América Morales Díaz, Flabio Mirelez Delgado. **Reduction of the delay effect in the communication of a differential mobile robot using particle filter algorithm**. National Conference of automatic control 2015. October 2015, Cuernavaca, Morelos. México. [[Pdf](#)]
- F. Mirelez Delgado, A. Morales-Díaz, R. Ríos Cabrera, H. Pérez Villeda. **Servo-visual control of a Kuka youBot to move and manipulate objects**. National Conference of automatic control 2015. October 2015, Cuernavaca, Morelos. México.

## PAPERS IN PREPARATION

---

- Héctor M. Pérez Villeda, Justus Piater, Matteo Saveriano, **Constrained Equation Learner Networks for Precision-Preserving Extrapolation of Robotic Skills** [[Pdf](#)] [[video](#)]. Submitted to IEEE Transactions on Robotics (T-RO), 2024
- Héctor M. Pérez Villeda, Justus Piater, Matteo Saveriano, **Weights initialization searching for Neural Networks via Bayesian Optimization over a dimensional reduced space**.
- Héctor M. Pérez Villeda, Justus Piater, Matteo Saveriano, **Improving the Generalization of Task-Parameterized Equation Learner Networks using Contextual Information** [[video](#)]. Submitted to ICRA 2025
- Héctor M. Pérez Villeda, Justus Piater, Matteo Saveriano, **PyNNLib: A Python Library for Learning Basis Functions in Constrained Quadratic Optimization for Regression**

## WORK EXPERIENCE

---

Graz, Austria	<b>Robotics &amp; A.I. Research Engineer at ARTI</b>
May	<ul style="list-style-type: none"><li>• Robotics software developer</li></ul>
2023-Present	<ul style="list-style-type: none"><li>• Support for research proposal submission</li></ul>
	Projects participation:
	<ul style="list-style-type: none"><li>• Technical leader at TASTE: Transformative AI-Assisted Testing in Industrial Mobile Robotics</li><li>• Developer of REal2Sim2Real. Simulation parameters</li></ul>

optimization from real-robot environment interactions / real-robot parameters refinement using post-optimized simulations.

- Collaborator at PRESENT (PREdictions for Science, Engineering N' Technology)

Lisboa,  
Portugal.  
2019-2019

**Research Engineer at Institute of Plasma and Nuclear Fusion (Instituto Superior Técnico):**

- Implementation and testing of Kalman filter for localization in Autonomous Mobile Robots.

Coah., Mexico.  
2017- 2019.

**Research collaborator at CINVESTAV**

- Hierarchical tasks for multi-robot coordination control based on quadratic programming. [\[video\]](#)
- Time convergence for hierarchical tasks based on quadratic programming applied to multi-robot coordination control. [\[video\]](#)
- Vision system set-up for pose estimation of multi-robot coordination systems. [\[video\]](#)

Coah., Mexico.  
2015 -2019

**Co-founder and Robotics manager at INTROID INC.**  
[www.introid.com](http://www.introid.com)

- Business plan and execution for capital raising.
- Evaluation of training needs for industrial plant production lines, designing effective training plans, and playing a key role in negotiations. Coordinating and executing training initiatives.
- Automation projects leader. Development and management of engineering projects for different companies.
- Automation and vision inspection consultant for quality processes for automotive companies.

**Highling projects:**

- **Automation of Robotics welding with UR10 and SnapWeld. Set-up, programming and implementation.** [\[video\]](#), Bend World Class manufacturing. México, Sept 2018.
- **Designing and implementing a vision systems-based station utilizing COGNEX vision systems for quality inspection within a plastic injection process.** CIE-PEMSA Company, Saltillo plant. Sep 2017

## Industrial training instructor: [[Industry](#)]

- **COGNEX Vision Systems. APTIVE company**, August 2018 Coahuila Mexico.
- **COGNEX Vision Systems. Introid Inc.**, August 2017, Coahuila Mexico.
- **Speed Control of Three phases induction motor. FLAMBEAU Plastics. S.A. de C.V.**, June 2017, Saltillo, Mexico.
- **FANUC Robot Programming., FIAT CHRYSLER ENGINE PLANT**, April 2017, Saltillo, Mexico.
- **FANUC Robot Programming. FIAT CHRYSLER ENGINE PLANT**, March 2017, Coahuila Mexico.
- **OMRON PLC Programming., FLAMBEAU Plastics. S.A. de C.V.**, November 2016, Saltillo, Mexico.
- **LabVIEW programming and PID control. RASSINI S.A. DE C.V**, August 2016, PIEDRAS NEGRAS PLANT.
- **Design of Experiments (D.O.E.) with Minitab, FIAT CHRYSLER ENGINE PLANT**, September 2016, Saltillo, Mexico.
- **Design of Experiments (D.O.E.) with Minitab, FIAT CHRYSLER ENGINE PLANT**, August 2016, Saltillo, Mexico.
- **Design of Experiments (D.O.E.) with Minitab, FIAT CHRYSLER ENGINE PLANT**, March 2015, Saltillo, Mexico

## TALKS

---

- **A.I. applied to Codeless robot programming** [[Link](#)]
- **Research opportunities in the industry, in Mexico and abroad** [[Link](#)]

## Personal Projects

---

- **CheersBox**: An automatic drink mixing machine that refines its mixing parameters based on user preferences and interactions for optimal results
- **FoodPilot**: End-to-end learning for mapping high dimensional data and robot motion primitives for manipulation tasks.

## FUNDING

---

**Fund obtained from the National Entrepreneur Fund (FNC) Section 2.6:** Development of innovation initiatives. Coahuila, México. July 2016. Reference number: FNE-160417-C2-6-00247575

## SUPERVISED THESIS

---

- **Weights initialization searching for Neural Networks via Bayesian Optimization over a dimensional reduced space.** Christina Schwaiger, Bachelor thesis. University of Innsbruck. Winter semester 2022 [[Pdf](#)]
- **Mapping and autonomous navigation in greenhouses.** Pablo Ochoa, Master thesis. CINVESTAV. Spring semester 2022

## LECTURER

---

- **Introduction to robotics.** University of Innsbruck. Winter semester 2022
- **Introduction to robotics.** University of Innsbruck. Winter semester 2021
- **Signal Processing.** University of Innsbruck. Winter semester 2021
- **Nonlinear Control.** Universidad del Valle de México (UVM). Spring 2015
- **Electrical circuits.** Universidad del Valle de México (UVM). Spring 2015
- **Linear algebra.** Universidad del Valle de México (UVM). Spring 2015