

# Juan Camilo Gamboa Higuera

Amateur roboticist  
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## Education

- 2013–present **Ph.D. Candidate** in Computer Science, *McGill University*  
Thesis: Learning robot locomotion controllers using low fidelity models  
Advisors: Gregory Dudek and David Meger  
Thesis committee: Joelle Pineau, Doina Precup and Frank Ferrie
- 2010–2012 **M.Sc.** Computer Science, *McGill University*  
Thesis: Fair subdivision of multi-robot tasks  
Advisor: Gregory Dudek
- 2005–2009 **B.Eng.** Systems and Computer Engineering, *Universidad de los Andes (Colombia)*
- 2003–2007 **B.Eng.** Electronics Engineering, *Universidad de los Andes (Colombia)*

## Research Interests

Learning motor controllers for robotics. Imitation learning without control inputs. Learning from low fidelity domains for simulation-to-robot transfer. Bayesian methods in robotics.

## Publications

### Refereed Conference Papers

- 2020 Manderson, T., Gamboa Higuera, J. C., Wapnick, S., Tremblay, J.-F., Meger, D., and Dudek, G. (2020). Vision-based goal-conditioned policies for underwater navigation in the presence of obstacles. In *Proceedings of Robotics: Science and Systems (R:SS '20)*
- 2020 Koreitem, K., Shkurti, F., Manderson, T., Chang, W.-D., Gamboa Higuera, J. C., and Dudek, G. (2020). One-shot informed robotic visual search in the wild. In *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS '20)*
- 2020 Mozifian, M., Gamboa Higuera, J. C., Meger, D., and Dudek, G. (2020). Learning domain randomization distributions for training robust locomotion policies. In *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS '20)*
- 2019 Jiang, W., Gamboa Higuera, J. C., Angles, B., Sun, W., Javan, M., and Yi, K. M. (2020). Optimizing through learned errors for accurate sports field registration. In *The IEEE Winter Conference on Applications of Computer Vision (WACV '20)*
- 2019 Thakur, S., van Hoof, H., Gamboa Higuera, J. C., Precup, D., and Meger, D. (2019). Uncertainty aware learning from demonstrations in multiple contexts using bayesian neural networks. In *IEEE International Conference on Robotics and Automation (ICRA '19)*
- 2018 Gamboa Higuera, J. C., Meger, D., and Dudek, G. (2018). Synthesizing neural network controllers with probabilistic model based reinforcement learning. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS '18)*
- 2018 Manderson, T., Gamboa Higuera, J., Cheng, R., and Dudek, G. (2018). Vision-based autonomous underwater swimming in dense coral for combined collision avoidance and target selection. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS '18)*
- 2017 Gamboa Higuera, J. C., Meger, D., and Dudek, G. (2017a). Adapting Learned Robotics Behaviours through Policy Adjustments. In *IEEE International Conference on Robotics and Automation (ICRA '17)*

- 2017 Shkurti, F., Chang, W.-D., Henderson, P., Islam, M. J., Gamboa Higuera, J. C., Li, J., Manderson, T., Xu, A., Dudek, G., and Sattar, J. (2017). Underwater multi-robot convoying using visual tracking by detection. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS '17)*
- 2015 Meger, D., Gamboa Higuera, J. C., Xu, A., Giguere, P., and Dudek, G. (2015). Learning legged swimming gaits from experience. In *IEEE International Conference on Robotics and Automation (ICRA '15)*
- 2014 Meghjani, M., Shkurti, F., Gamboa Higuera, J. C., Kalmbach, A., Whitney, D., and Dudek, G. (2014). Asymmetric rendezvous search at sea. In *2014 Canadian Conference on Computer and Robot Vision (CRV '14)*, pages 175–180. IEEE
- 2013 Gamboa Higuera, J. C. and Dudek, G. (2013). Fair Subdivision of Multi-Robot Tasks. In *IEEE International Conference on Robotics and Automation (ICRA '13)*
- 2012 Shkurti, F., Xu, A., Meghjani, M., Gamboa Higuera, J. C., Girdhar, Y., Giguere, P., Dey, B. B., Li, J., Kalmbach, A., Prahacs, C., Turgeon, K., Rekleitis, I., and Dudek, G. (2012). Multi-Domain Monitoring of Marine Environments Using a Heterogeneous Robot Team. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS '12)*
- 2012 Gamboa Higuera, J. C., Xu, A., Shkurti, F., and Dudek, G. (2012). Socially-driven collective path planning for robot missions. In *Canadian Conference on Computer and Robot Vision (CRV '12)*

### Workshop abstracts

- 2019 Mozifian, M., Gamboa Higuera, J. C., Meger, D., and Dudek, G. (2019). Learning domain randomization distributions for transfer of locomotion controllers. In *Workshop on Multi-Task and Lifelong Reinforcement Learning at ICML 2019*
- 2017 Gamboa Higuera, J. C., Meger, D., and Dudek, G. (2017b). Synthesizing neural network controllers with probabilistic model-based reinforcement learning. In *2nd Bayesian Deep Learning Workshop at NIPS 2017*

### Seminars and Talks

- 12/2018 *Synthesizing Neural Network Controllers with Model-Based RL*. NSERC Canadian Robotics Network (NCRN) Workshop on Reinforcement Learning in the Real World Huawei, Montreal, Quebec, Canada.
- 11/2017 *Learning locomotion controllers with low-fidelity simulation*. Microsoft Research Dissertation Grant Workshop, Redmond, Washington, USA.
- 09/2017 *From simulation to the field: Learning to swim with the AQUA robot*. Robot Operating System Conference (ROSCon 2017), Vancouver, British Columbia, Canada.

### Teaching Experience

- 2011–2016 **Teaching Assistant**, McGill University  
Teaching assistant for Introduction to Computer Science (Winter 2011, Winter 2012), Software Development (Fall 2011), Introduction to Computer Animation (Winter 2013), Theory of Computation (Fall 2014), and Artificial Intelligence (Winter, 2016)
- Fall 2014 **Course Lecturer**, McGill University  
Instructor for Introduction to Programming.
- Fall 2009 **Course Lecturer**, San Martin University  
Instructor for Applied Mathematics in Software Engineering. The subject for the term was an introduction to robotics.

## Academic Service

Reviewer for IROS (2014, 2015, 2016, 2017, 2018, 2019, 2020), ICRA (2015, 2016, 2017, 2018, 2019, 2020), CoRL (2018, 2020), and ICLR (2020).

Program Committee member for the IROS 2019 Workshop on *Informed Scientific Sampling in Large-scale Outdoor Environments*.

General and Operations Chair for the NeurIPS 2019 *LatinX in AI Workshop*.

Co-organizer for the R:SS 2020 *2nd Workshop on Closing the Reality Gap in Sim2Real Transfer for Robotics*

## Professional Experience

- 2020      **Machine Learning Researcher**, SPORTLOGiQ Inc.  
 Research on simulation of sporting events for motion, event and outcome predictions.
- 2019      **Robotics Research Intern**, Samsung Research AI Center - Montreal  
 Learning navigation policies for home robots.
- 2016–2019   **Computer Vision Researcher**, SPORTLOGiQ Inc.  
 Automated camera calibration and tracking algorithm using self-supervised learning and convolutional neural networks. Data association algorithms for real-time tracking with multiple cameras.
- 2015      **Computer Vision Research Intern**, SPORTLOGiQ Inc.  
 Designed an algorithm for automated camera calibration using synthetic templates
- 2009      **Software Engineer**, Unisys Colombia  
 Optimized front-end code for low bandwidth channels for a web-based banking system.

## Technical Skills

**Programming** Python, C, C++, MATLAB, L<sup>A</sup>T<sub>E</sub>X, HTML, JavaScript

**Robotics and Computer Vision** ROS, Gazebo, OpenCV, experience with a variety of robotics related hardware

**Other** Embedded systems, PCB design, 3D printing.

## Awards

**Microsoft Research Dissertation Grant** (2017).

**MITACS Accelerate** for research on Computer Vision at SPORTLOGiQ Inc. (2015)

**Hydro-Quebec Doctoral Scholarship in Science** (2013–2016).

**McGill Graduate Research Mobility Award** for research on marine robotics at Memorial University, under guidance of Dr. Ralf Bachmayer (2013).

**McGill Graduate Excellence Award in Computer Science** (2012–2013).

**McGill Provost's Graduate Fellowship** (2010).

## Other

Native Spanish speaker. Proficient in English and French. Certified open water diver. I enjoy cycling, skateboarding and playing the ukulele. Full list of references available upon request.