Carolina Higuera Arias

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Education

- **MS in Electronics and Computer Engineering** *January 2015 – March 2017*
  Universidad de los Andes Bogotá, Colombia
  Thesis: "Multiagent Reinforcement Learning Applied to Traffic Light Signal Control"
  GPA: 4.80/5.00

- **BS in Electronics Engineering** *January 2010 – April 2015*
  Universidad Pedagógica y Tecnológica de Colombia Tunja, Colombia
  Thesis: "Performance Evaluation of PID, Algebraic and Diffuse Logic Controllers for Temperature and Level Regulation in Cascade Tanks"
  GPA: 4.5/5.0

Research Experience

- **Universidad de los Andes** *August 2019 - Present*
  Researcher SinfonIA Alliance, Development of social capabilities for a Pepper robot Bogotá, Colombia
  - Implementing Reinforcement Learning algorithms, using baselines of OpenAI and the robotic operating system ROS, for autonomous navigation and obstacle avoidance for a semi-humanoid Pepper robot
  - Advising students during the development of foundational AI skills like person detection, person recognition, object recognition and speech, using Machine Learning and Computer Vision techniques
  - Representing the group as Team Leader for RoboCup@Home 2021 competition

- **Universidad Santo Tomás** *March 2018 - July 2019*
  Researcher, Inference from demonstrations for learning movements in a semi-humanoid robot Bogotá, Colombia
  - Applied inverse reinforcement learning to infer the reward function implicit on video demonstrations of people making arm movements
  - Utilized computer vision tools as OpenPose to extract joints, and LSTM neural networks to predict movements
  - Reproduced the learned policy with the inferred reward function on a semi-humanoid robot with Coppelia robot simulator

- **Universidad de los Andes** *August 2015 - December 2016*
  Thesis, Multi-agent Reinforcement Learning Applied to Traffic Light Signal Control Bogotá, Colombia
  Advisor: Ph.D Fernando Lozano
  - Applied game theory to multiagent reinforcement learning setting to solve the problem of resource assignment for traffic lights and agent's coordination
  - Measured policy performance in SUMO traffic simulator, according to average travel times in a grid of intersections in Bogotá, Colombia

Publications

- **C. Higuera**, F. Lozano, C. Camacho, and C. H. Higuera. Demonstration of Multiagent Reinforcement Learning Applied to Traffic Light Signal Control. *International Conference on Practical Applications of Agents and Multi-Agent Systems*. 2019. DOI: 10.1007/978-3-030-24209-1_25

- **C. Higuera**, F. Lozano, C. Camacho, and C. H. Higuera. Multiagent Reinforcement Learning Applied to Traffic Light Signal Control. *International Conference on Practical Applications of Agents and Multi-Agent Systems*. 2019. DOI: 10.1007/978-3-030-24209-1_10

- Y. Suarez, **C. Higuera**, and C. Camacho. Inverse Reinforcement Learning Application for Discrete and Continuous Environments. *The 6th International Conference on Advanced Engineering - Theory and Applications 2019*. DOI: 10.1007/978-3-030-53021-1_35

- A. Rey, A. Ruiz, C. Camacho, and **C. Higuera**. Vision based upper limbs movement recognition using LSTM neural network. *The 6th International Conference on Advanced Engineering - Theory and Applications 2019*. DOI: 10.1007/978-3-030-53021-1_38

- C. Camacho, C. Pedraza, and **C. Higuera**. An artificial vision based method for vehicle detection and classification in urban traffic. *IbPRIA 2019: 9th Iberian Conference on Pattern Recognition and Image Analysis*. DOI: 10.1007/978-3-030-31321-0_34

- **C. Higuera**, C. Camacho, F. Soler, O. Rodríguez, and F. Jiménez. PI Vectorial Control of Level and Temperature for Cascading Tank System. *2015 CHILEAN Conference on Electrical, Electronics Engineering, Information and Communication Technologies (CHILECON)*. DOI: 10.1109/Chilecon.2015.7400354

Teaching Experience

- **Universidad de los Andes** *August 2019 - Present*
  Full-Time Lecturer, Department of Electrical and Electronics Engineering Bogotá, Colombia
  - Teaching undergraduate courses about analog electronics, electrical circuits, signals and systems and robotics, with an average of 40 students per course
  - Designing supplementary material with a team of 4 teaching assistants and 6 monitors
  - Advising undergraduate students during their degree project on Machine Learning and Robotics
  - Offering continuing education courses in Reinforcement Learning to 25 students
  - Team leader of the SinfonIA Pepper team for RoboCup@Home 2021

- **Universidad Santo Tomás** *March 2018 - July 2019*
  Full-Time Lecturer, Department of Electronics Engineering Bogotá, Colombia
  - Taught undergraduate courses about analog electronics, electrical circuits, and operating systems, with an average of 20 students per course
  - Offered an elective course on artificial intelligence to undergraduate students
  - Advised undergraduate students during their capstone project in Machine Learning
  - Member of GED research group in studies and development in robotics
  - Leader of the research line in computational intelligence

- **Sergio Arboleda College** *February 2017 - February 2018*
  Lecturer, Department of Electronics Engineering Bogotá, Colombia
  - Taught undergraduate courses about analog electronics and electrical circuits, with an average of 10 students per course
  - Managed laboratory functions including organization, ordering, and equipment use, with a team of 2 technicians

Scholarships and Awards

- **Fulbright Minciencias Scholarship** *August 2020*
  Selected for the Fulbright – Ministry of Science, Technology and Innovation of Colombia Scholarship - cohort 2021, to pursue PhD studies in the United States

- **Certification for excellent academic performance during the MS graduate program** *March 2017*

Research and Computer Skills

- **Programming Languages**: C++, Python, Java, Unix Bash

- **AI and Machine Learning**: Reinforcement learning, convolutional neural networks, recurrent neural networks

- **Frameworks and APIs**: Keras, OpenCV, ROS, TensorFlow