SERGIO E. GARCÍA-VERGARA

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RESEARCH INTERESTS

Autonomous robotic systems, systems and controls, healthcare robotics, assistive technology, human-robot interaction, pattern recognition, and machine learning.

EDUCATION

Georgia Institute of Technology **Atlanta, GA**
Ph.D. in Electrical and Computer Engineering May 2017
Dissertation: *Coupling of an Objective and Quantifiable Methodology for Assessing Upper-body Movements with VR Gaming Platforms*

Georgia Institute of Technology **Atlanta, GA**
MS in Electrical and Computer Engineering May 2014
Graduated Cum Laude
Minor: *Computer Science*

University of Puerto Rico at Mayagüez **Mayagüez, PR**
BS in Electrical Engineering June 2011
Graduated Magna Cum Laude

SKILLS

Programming Languages	Python, C, C++, C#, Java
Engineering Software	ROS1 & ROS2, Matlab, Visual Studio, LabView, Simulink, Eclipse
Operating Systems	Linux, Windows
Tools	Docker, LaTeX, Emacs, Git, Cygwin. CMake, Bash
Robotic Platforms	DARwin-OP, AmigoBot, Pioneer 3-AT, BlueEagle, DJI S1000
Languages	Fully proficient in English and Spanish. (Basic knowledge in German).

WORK EXPERIENCE

CTO & Co-founder October 2020 - present
RIF Robotics Corp. | Atlanta, GA

- Developing a robust autonomy architecture to help with hospital logistics.
- Working directly with hospital staff to identify problems that can be solved with robotics.

Research Engineer II January 2017 - October 2020
Georgia Tech Research Institute | Atlanta, GA *Supervisor: Dr. Charles Pippin*

- Developed algorithms for collaborative autonomous systems including, but not limited to, task allocation, path planning, and computer vision.
- Helped develop the lab's autonomy architecture software and build system.
- Responsibilities included algorithm development, software development, proposal creation, technical reporting, customer interfacing, and project management.

Graduate Research Assistant May 2012 - December 2016
Georgia Tech HumAnS Lab | Atlanta, GA *Supervisor: Dr. Ayanna M. Howard*

- Developed an interactive virtual reality gaming system for rehabilitation in the home environment.
- Developed an objective and quantifiable methodology for evaluating the kinematic performance of individuals who have some form of motor skills disorder.
- Developed a pattern recognition algorithm to determine the level of the user's kinematic performance such that the virtual reality platform can autonomously adapt to the user's needs.

Graduate Research Assistant August 2011 - May 2012
Georgia Tech MRL Lab | Atlanta, GA *Supervisor: Dr. Ronald C. Arkin*

- Implemented the architecture and support for knowledge sharing across heterogeneous robotic agents as part of the MAST (Micro Autonomous Systems Technology) project.
- Designed the conceptual spaces for the different robotic platforms based on their respective sensors as a base for the communication and interpretation of the acquired data (i.e. vision, laser range finder, thermal, etc).

Summer Undergraduate Researcher Summer 2010
University of California | Berkeley, CA *Supervisor: Dr. Seth Sanders*

- Used COMSOL Multiphysics to design a 3-phase 6-pole permanent magnet alternator to be coupled with a Stirling engine system.

Summer Undergraduate Researcher Summer 2009
Purdue University | West Lafayette, IN *Supervisor: Dr. Eric Stach*

- Used LabVIEW to write the needed drivers to couple mass flow controllers with the Birck Nanotechnology Center's transmission electron microscope.

Undergraduate Research Assistant August 2009 - January 2011
University of Puerto Rico | Mayagüez, PR *Supervisor: Dr. Eduardo Ortiz*

- Designed the control system to control the speed of a DC motor powered by a fuel cell.
- Designed, built, and programmed a nonholonomic small robot car to find the center of an arbitrary 16x16 square maze.

Undergraduate Research Assistant Summer 2008
University of Puerto Rico | Humacao, PR *Supervisor: Dr. Rolando Oyola*

- Interfaced a fast spectroscopy device with an oscilloscope using LabVIEW to automate a nanosecond-laser flash photolysis system.

PUBLICATIONS AND PRESENTATIONS

Journal Publications and Book Chapters

1. Y.P. Chen, **S. García-Vergara**, and A.M. Howard, "Effect of feedback from a socially interactive humanoid robot on reaching kinematics in children with and without cerebral palsy: a pilot study," *Developmental Neurorehabilitation*, Vol. 21, No. 8, pp. 490-496, 2018.
2. Y.P. Chen, **S. García-Vergara**, and A.M. Howard, "Effect of a Home-Based Virtual Reality Intervention for Children with Cerebral Palsy using Super Pop VR^{TM} Evaluation Metrics: A Feasibility Study," *Rehabilitation Research and Practice*, 2015.

3. **S. García-Vergara**, L. Brown, H.W. Park, and A.M. Howard, "Engaging children in play therapy: The coupling of virtual reality games with social robotics," *Technologies of Inclusive Well-Being*, Springer Berlin Heildelberg, pp. 139-163, 2014.

Refereed Conference Publications

1. D. Bryant, J. Boyd, J. Harris, M. Smith, **S. García-Vergara**, Y.P. Chen, and A.M. Howard, "An Infant Smart-Mobile System to Encourage Kicking Movements in Infants At-Risk of Cerebral Palsy," *IEEE Workshop on Advanced Robotics and its Social Impacts (ARSO)*, pp. 1-5, 2017.
2. **S. García-Vergara**, P. Robinette, Y.P. Chen, and A.M. Howard, "Validation of a Physical Rehabilitation Game using Markerless versus Marker-based Motion Capture Systems," *IEEE EMBS Conference*, 2016.
3. **S. García-Vergara**, L. Brown, Y.P. Chen, and A.M. Howard, "Increasing the Efficacy of Rehabilitation Protocols for Children via a Robotic Playmate Providing Real-time Corrective Feedback," *IEEE Conference on Robot and Human Interactive Communication (Ro-Man)*, pp. 700-705, 2016.
4. L. Brown, **S. García-Vergara**, and A.M. Howard, "Evaluating the Effect of Robot Feedback on Motor Skill Performance in Therapy Games," *IEEE Conference on Systems, Man, and Cybernetics (SMC)*, pp. 1060-1065, 2015.
5. **S. García-Vergara**, H. Li, and A.M. Howard, "Increasing Super Pop VR$^{\text{TM}}$ Users' Intrinsic Motivation by Improving the Game's Aesthetics," *International Conference on Universal Access in Human-Computer Interaction*, pp. 432-441, 2015.
6. **S. García-Vergara**, M.M. Serrano, Y.P. Chen, and A.M. Howard, "Developing a Baseline for Upper-body Motor Skill Assessment Using a Robotic Kinematic Model," *IEEE Conference on Robot and Human Interactive Communication (Ro-Man)*, pp. 911-916, 2014.
7. **S. García-Vergara**, and A.M. Howard, "Three-dimensional Fitts Law Model used to Predict Movement Time in Serious Games for Rehabilitation," *International Conference on Virtual, Augmented and Mixed Reality*, pp. 287-297, 2014.
8. **S. García-Vergara**, Y.P. Chen, and A.M. Howard, "*Super Pop VR^{TM}* : an Adaptable Virtual Reality Game for Upper-Body Rehabilitation," *International Conference on Human-Computer Interaction*, pp. 40-49, 2013.
9. R.C. Arkin, **S. García-Vergara**, and S.G. Lee, "Architectural Design and Support for Knowledge Sharing Across Heterogeneous MAST systems," *SPIE Conference*, pp. 84070C, 2012.
10. A.M. Howard, L. Roberts, **S. García-Vergara**, and R. Quarells, "Using Mixed Reality to Map Exercise Demonstrations to a Robot Exercise Coach," *IEEE Mixed and Augmented Reality (ISMAR) Conference*, 2012.
11. P.J. González-Rivera, J. Santiago-González, **S. García-Vergara**, and E. Ortiz-Rivera, "Design of an Observer and Speed Controller for a DC Motor Fed by Fuel Cells and DC to DC Converters," *IEEE Power and Energy Society General Meeting*, pp. 1-6, 2011.
12. **S. García-Vergara**, P. León, Y.J. Díaz-Mercado, and E. Ortiz-Rivera, "An Integrated Undergraduate Research Experience in Control, Power Electronics, and Design using a Micromouse," *IEEE Frontiers in Education Conference*, pp. T3D-1, 2010.

Refereed Conference Presentations

1. L. Clackum, F. Fayyaz, T. Gordon, K. Lansing, Y.P. Chen, **S. García-Vergara**, A.M. Howard, B. Weissman, and J. Hallman-Cooper, "Effect of Functional Strength Training to Improve Arm

Function in Children with Cerebral Palsy: A Case Study," *Combined Sections Meeting, American Physical Therapy Association*, New Orleans, LA, February, 2018.

2. Y.P. Chen, **S. García-Vergara**, and A.M. Howard, "Evaluation of trials necessary to achieve performance stability in a reaching kinematics movement analysis game," *Combined Sections Meeting, American Physical Therapy Association*, New Orleans, LA, February, 2018.

3. Y.P. Chen, **S. García-Vergara**, A.M. Howard, "Examining the Effect of Feedback from a Humanoid Robot on Reaching Kinematics in Children with Cerebral Palsy," (Poster presented at) *NEXT Conference, American Physical Therapy Association*, Boston, MA, June, 2017.

4. L. Clackum, F. Fayyaz, T. Gordon, K. Lansing, Y.P. Chen, **S. García-Vergara**, and A.M. Howard, "Effect of Rhythmic Auditory Stimulation in Virtual Reality Games to Improve Arm Function in Children with Cerebral Palsy: A Case Study," (Poster presented at) *NEXT Conference, American Physical Therapy Association*, Boston, MA, June, 2017.

5. C. Beegle, A. Rollins, J. Tyra, Y.P. Chen, **S. García-Vergara**, and A.M. Howard, "Test-retest Reliability and Minimal Detectable Change in the Super Pop VR^{TM} Game in Children with and without Cerebral Palsy," (Poster presented at) *Combined Sections Meeting, American Physical Therapy Association*, San Antonio, TX, February, 2017.

6. E. Danish, S. Epling, S. Smelser, Y. Zhang, Y.P. Chen, **S. García-Vergara**, A.M. Howard, B. Weissman, and J. Hallman-Cooper, "Virtual Reality Gaming System can be used in Home Based Treatment in Children with Cerebral Palsy: A Case Study," (Poster presented at) *NEXT Conference, American Physical Therapy Association*, Nashville, TN, June, 2016.

7. E. Bermudez, M. Layman, E. Shepard, Y.P. Chen, **S. García-Vergara**, and A.M. Howard, "Test-Retest Reliability and Minimal Detectable Change in the Super Pop VR^{TM} game in Healthy Children," (Poster to be presented at) *Combined Sections Meeting, American Physical Therapy Association*, Anaheim, CA, February 2016.

8. Y.P. Chen, **S. García-Vergara**, and A.M. Howard, "Test-Retest Reliability and Minimal Detectable Change of Super Pop VR^{TM} in Healthy Adults," (Poster presented at) *Combined Sections Meeting, American Physical Therapy Association*, Indiannapolis, IN, February, 2015.

9. B. Denmark, A. Harrod, B. Steele, T. Weekley, **S. García-Vergara**, A.M. Howard, and Y.P. Chen, "Effect of Virtual Reality Intervention on Upper-Extremity Function in a Child with Cerebral Palsy: A Case Study," (Poster presented at) *Physical Therapy Association of Georgia*, Atlanta, GA, September, 2014.

PATENTS

Patents

1. R.E. Torres-Muñiz, **S.E. García-Vergara**, B.A. Llorens-Bonilla, D. Sánchez-Cordero, and M. Lizama, "Switch-Actuated Joystick for Power Wheelchairs", U.S. Patent 8 622 166 B1, January 7, 2014.

Developed a switch-actuated adapter for joystick controlled wheelchairs such that individuals with limited mobility can continue making use of their chairs and avoid spending money on new ones.

FELLOWSHIPS & AWARDS

1. *Sam Chih Foundation Award*, Georgia Institute of Technology 2016
2. *Alfred P. Sloan Foundation Fellowship*, Georgia Institute of Technology 2013-2016

3. *Goizueta Fellowship*, Georgia Institute of Technology 2012-2016
4. *NSF Graduate Research Fellowship*, Georgia Institute of Technology 2012-2015
5. *Marion & Henry Bourne ECE Graduate Fellowship*, Georgia Institute of Technology 2011
6. *Member of the Tau Beta Pi National Honor Society*, University of Puerto Rico at Mayagüez 2010
7. *Puerto Rico - Louis Stokes Alliance for Minority Program (PRLSAMP) Scholarship*, University of Puerto Rico at Mayagüez 2008
8. *Member of the Dean's List throughout undergraduate studies*, University of Puerto Rico at Mayagüez 2006-2011

TEACHING EXPERIENCE

Teaching Certificate May 2015
Tech to Teaching *Georgia Tech | Atlanta, GA*

- Higher Education Pathway Intermediate Certificate

Instructor on Record August 2014 - December 2014
Course: Graduate Teaching Assistant Preparations *Georgia Tech | Atlanta, GA*

- Prepared weekly lesson plans and gave in-class lectures.
- Graded homeworks and course materials.

Graduate Teaching Assistant June 2013 - August 2013
Course: Linear Circuits *Georgia Tech | Atlanta, GA*

- Answered students' questions in the classroom and via the student forums on the Coursera website.
- Prepared and explained practice problems to help students better understand the material.

SERVICE & VOLUNTEER WORK

Reviewer

1. IEEE International Symposium on Robot & Human Interactive Communication (RO-MAN)

Outreach

1. *Coach for the First Lego League Competition*, East Atlanta Kids Club 2017
2. *Brownwood Bike Rally Volunteer*, East Atlanta Kids Club 2017
3. *Summer Undergraduate Research in Engineering (SURE) Program, Graduate Student Mentor*, Georgia Institute of Technology 2016
4. *Middle School STEM Camps, Graduate Student Mentor*, Georgia Institute of Technology 2016
5. *National Robotics Week, Robotics and Intelligent Machines Center Open House*, Georgia Institute of Technology 2016
6. *GoSTEM Latino STEM Fair*, Georgia Institute of Technology 2015-2016
7. *FOCUS Program, New Students Visitation Weekend*, Georgia Institute of Technology 2013-2016
8. *ECE Recruiting Events, Lab Tours and Demos*, Georgia Institute of Technology 2013-2016
9. *Chestatee Academy Middle School Latino Students Visit, Graduate Student Panel*, Georgia Institute of Technology 2015

10. *GoSTEM Latino STEM Education Day*, Meadowcreek High School 2014-2015
11. *Science Fair Judge*, Lilburn Elementary School 2014
12. *Technology Student Association (TSA), High School TEAMS Competition*, Georgia Institute of Technology 2013-2014
13. *H.O.T. Days, Robot Programming Workshop*, Georgia Institute of Technology 2013-2014
14. *Campbell Middle School Minority Students Visit, Graduate Student Panel*, Georgia Institute of Technology 2013
15. *Southwest Miami High School Latino Students Visit, Graduate Student Panel*, Georgia Institute of Technology 2012

REFERENCES

Available upon request.