SARAH AGUASVIVAS MANZANO

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EDUCATION

PhD Student, Computer Science   *August 2017 - Present*
University of Colorado, Boulder   Expected Graduation: December 2021
Department of Computer Science, Correll Lab   GPA: 4.0/4.0

Master of Science, Aerospace Engineering   *August 2015 - August 2017*
The Pennsylvania State University   GPA: 3.6/4.0
Minors: Computational Science, Electrical Engineering
Thesis: *"Performance and Parsimony in Training Deep Neural Networks"*

Bachelor of Science, Aerospace Engineering   *August 2013 - May 2015*
The Pennsylvania State University   Class Rank: 4/103
Thesis: *"Corrections to the BEMT Method for Highly Loaded Wind Turbine Blades"*   GPA: 3.9/4.0

PUBLICATIONS

Aguasvivas Manzano, S., Xu, P., Ly, K., Shepherd, R., Correll, N. High-bandwidth nonlinear control for soft actuators with recursive network models. International Symposium of Experimental Robotics (ISER, Malta 2020). **Accepted for Publication**. Link to arxiv.

Aguasvivas Manzano, S., Hughes, D., Simpson, C., Patel, R., Correll, N. Embedded Neural Networks for Robot Autonomy. International Symposium on Robotics Research (ISRR Hanoi, 2019). Link to arxiv.

Aguasvivas Manzano, S., Correll, N. In-situ Deep Learning for Prediction and Controls in Smart Composites. 22nd International Conference on Composites Materials (2019). Presentation

Aguasvivas Manzano, S., Hughes, D., Correll, N. Wireless Online Impact Source Localization on a Composite. 4th International Conference on System-Integrated Intelligence (2018).

Aguasvivas Manzano, S., Lavely, A., Vijayakumar, G., Brasseur, J., Schmitz, S. Nonsteady Wind Turbine Loading Response to Passage of Daytime Atmospheric Turbulence Eddies. Annual Meeting of the APS Division of Fluid Dynamics 68 (2015). Link to movie

Aguasvivas Manzano, S., Jha, P., Plummer, J., and Schmitz, S. "Turbulent Transport in the Wakes of Wind Turbines." Annual Meeting of the APS Division of Fluid Dynamics 67 (2014). Link to movie

Hava, H., Zhou, L., Lombardi, L., Cui, K., Joung, H., **Aguasvivas Manzano, S.**, et.al. SIRONA: Sustainable Integration of Regenerative Outer-space Nature and Agriculture. Part I. Architecture and Technology Session. International Conference on Environmental Systems (2019). Link to publication.

Basu, K., Melton, R., **Aguasvivas Manzano, S.** Time-Optimal Reorientation using Neural Networks and Particle Swarm Formulation. AAS/AIAA Astrodynamics Specialist Conference Columbia River Gorge, Stevenson, WA (2017). Link to publication in AIAA

SKILLS

C/C++ ⋄ Python ⋄ Teaching ⋄ Core Aerospace Concepts ⋄ HPC ⋄ OOP ⋄ MATLAB ⋄ Linux ⋄ Engr. Mechanics ⋄ Math/Numerical Methods for Engineers ⋄ Neural Networks ⋄ OpenAI ⋄ SUMO

TEACHING EXPERIENCE

CU Boulder, Teaching Assistant, CSCI 1320: Introduction to Programming for Engineering Students
Penn State, Teaching Assistant, CMPSC 200 and 201: Intro to MATLAB and Intro to C++
Penn State, Teaching Assistant, AERSP 430: Spacecraft Propulsion
Penn State, Teaching Assistant, AERSP 497I/597I: Spacecraft-Environment Interactions
Penn State, Teaching Assistant, AERSP 313: Aerospace Analysis (Numerical Analysis in MATLAB)
Penn State, Teaching Assistant, AERSP 305W: Aerospace Technology Laboratory: Aerodynamics Lab

WORK EXPERIENCE

University of Colorado Boulder   Jan 2018- Present
Graduate Research Assistant

⋄ Design, manufacture and perform experiments (hardware end to software end) on online prediction and controls in robotic composite materials with embedded sensors, actuators and computers using advanced signal processing and artificial intelligence. ⋄ Mentor undergraduate and master students towards team-oriented research (*Mentees: Cooper Simpson, Aaron Parker, LeeLee Graham, Ankit Srivastava*).

National Renewable Energy Lab (NREL)   May 2019- August 2020
Graduate Research Intern

⋄ Proposed, built and deployed *KFlow*: an OpenAI gym and set of stand-alone utilities that introduce the Dynamic Bicycle Model (with variable tire models) into the SUMO/TraCI API for continuous steering and acceleration control for the purpose of reinforcement learning ⋄ Developed classical, model-based controller and other state of the art controllers in an in-house PyGame 2D driver (*KRoad*) simulator on the path following task.

NIST — PREP Fellowship   April 2018- September 2018
Guest Researcher

⋄ *Theoretical Quantum Computing:* Parallelized a Python package for numerical quantum state tomography on a single qubit, thus reducing computation time (up to 20X in HPC cluster) and improved the numerical computation with the help of statisticians, physicists and applied mathematicians. ⋄ *PREP Student Payroll Database:* IT services for a database with financial information for the PREP Fellowship awardees based on Access, SQL and VBA.

The Pennsylvania State University   August 2015-December 2017
Graduate Teaching Assistant

The Pennsylvania State University   May 2017-August 2017
PSU ICS Cluster Tech

⋄ Tech support and customer interaction on the usage of a medium-sized HPC cluster called ICS for researchers. ⋄ Developed wikis, tutorials and how-to guides for parallelization in MATLAB, Python and for Linux scripts

The Pennsylvania State University   2014-2015
Undergraduate Research Assistant

⋄ Created CFD (Computational Fluid Dynamics) animations of wind turbines at varying atmospheric settings using FieldView (by Intelligent Light), MATLAB and OpenFOAM Formulated a correction factor to the BEMT Method in a Penn State produced wind turbine solver called PSU-XTurb

RELEVANT PROJECTS

NREL Connected Autonomous Vehicles

Project currently being carried out with NREL to investigate the performance of reinforcement learning based control of acceleration and steering in multiple self-driving car scenarios. Developed multiple state of the art classical controllers like nonlinear MPC, Stanley, Pure Pursuit and linear time variant MPC to be used in a 2D car driving simulation.

Neural Networks for Microcontrollers (Open Source)

Open source compiler and set of command line tools that translate neural network trained model file binaries into embedded C code to be used in a microcontroller. Link to repository.

Nonlinear Output Tracking Technique for Soft Actuators

In collaboration with Robert Shepherds lab at Cornell. Currently developing multiple input multiple output (MIMO) controller that uses neural networks for system plant identification for a soft robotic morphing wing. Link to repository.

Terrain Sensitive Tire in Autonomous Driving Car

Worked on a team that developed a ROS based controller for autonomous driving in a hallway. Developed a method to determine the static friction coefficient between the cars tire and multiple terrains using a convolutional neural network in Keras with inputs from embedded piezoelectric strip sensors at the tire. Link to code

ACTIVITIES, HONORS AND AWARDS

⋄ Mentor and Aerospace Judge at 2020 NASA SpaceApp Challenge Santo Domingo

⋄ Women's team jiu jitsu coach at 10th Planet Boulder

⋄ Science Judge and Score Keeper 2020 Virtual Colorado Regional High School Science Bowl (Link to media.)

⋄ 2020 Berkeley Rising Stars Workshop Participant

⋄ 2nd Place: Unearthed Denver Hackathon (2017). Team Roosters (Link to rankings)

⋄ NIST PREP Fellow

⋄ CU Boulder Deans Assistantship Award

⋄ PSU Dean's List all semesters coursed

⋄ Member of Sigma Gamma Tau (invitation only)

⋄ Most Innovative Concept Award. NASA BigIdea Challenge (Link to media)

⋄ Volunteered for STEMrev (http://stemrev.org/)

⋄ Volunteered for Make4Covid sewing team (≈ 50 backstraps sewn)

PEER REVIEW

Conferences: IEEE International Conference on Robotics and Automation (ICRA), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS),

Journals: Robotics and Autonomous Systems, Sensors