Ana Lucia Cruz Ruiz

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Education

2013 – 2016 **Ph.D. degree in mechanics**, *École normale supérieure de Rennes and INRIA, Rennes*, France.

2011 – 2013 **Master's degree in control engineering, robotics and applied informatics - Specialization: Advanced robotics**, *École Centrale de Nantes*, France.

2007 – 2011 **Bachelor's degree in mechatronics**, *Universidad Tecnológica Centroamericana (UNITEC)*, Honduras.

Research Experience

2013 – 2016 **Ph.D. student**, École normale supérieure de Rennes and INRIA, Rennes, France.

Subject *Low-dimensional control representations for muscle-based characters.*

Control of virtual characters in physics-based simulations through the adaptation of human muscle synergies. Application for the control of unconstrained and hyper-dynamic motions (overhead throws).

Supervisors Georges Dumont and Charles Pontonnier.

2013 **Master's Thesis**, IRCCyN, Ecole Centrale de Nantes, France.

Subject *Mechanical design of cable-driven parallel robots.*

Application of a new index to assess the stability of cable-driven robots in function of their mechanical structure, and development of tools to automate their design for a variety of tasks.

Supervisors Stéphane Caro and Philippe Cardou.

Scientific Publications

Journals

2016 "Identifying a Low-Dimensional Motor Control Strategy in Throwing Motions", A. Cruz Ruiz, C. Pontonnier, G. Dumont. *Abstract accepted: Frontiers in Computational Neuroscience (Neuromechanics and Control of Physical Behavior: from Experimental and Computational Formulations to Bio-inspired Technologies).*

2016 "A Synergy-Based Control Solution for Overactuated Characters: Application to Throwing", A. Cruz Ruiz, C. Pontonnier, G. Dumont. *To be published in Computer Animation and Virtual Worlds.*

2016 "Muscle-Based Control For Character Animation", A. Cruz Ruiz, C. Pontonnier, N. Pronost, G. Dumont. *In Computer Graphics Forum.*

Conferences

2015 "Motion Control via Muscle Synergies: Application to Throwing", A. Cruz Ruiz, C. Pontonnier, J. Levy, G. Dumont. *In Proceedings of the 8th ACM SIGGRAPH Conference on Motion in Games.*

2015 "Identifying Representative Muscle Synergies in Overhead Football Throws", A. Cruz Ruiz, C. Pontonnier, A. Sorel, G. Dumont. *In Computer Methods in Biomechanics and Biomedical Engineering (CMBBE).*

2014 "A Bio-Inspired Limb Controller for Avatar Animation", A. Cruz Ruiz, C. Pontonnier, G. Dumont. *In Computer Methods in Biomechanics and Biomedical Engineering (CMBBE).*

2014 "ARACHNIS: Analysis of Robots Actuated by Cables with Handy and Neat Interface Software", A. Cruz Ruiz, S. Caro, P. Cardou, F. Guay. *In Proceedings of the Second International Conference on Cable-Driven Parallel Robots.*

2013 "Measuring How Well a Structure Supports Varying External Wrenches", F. Guay , P. Cardou, A. Cruz Ruiz, S. Caro. *In Proceedings of the Second Conference in New Advances in Mechanisms, Transmissions and Applications.*

Posters

2014 "A Bio-Inspired Limb Controller for Avatar Animation", A. Cruz Ruiz, C. Pontonnier, G. Dumont. *2014 Summer School on Neurorehabilitation, Baiona, Spain.*

Technical Projects & Skills

Completed Projects

Design and management of experiments for the identification of muscle synergies

During these experiments subjects performed right-hand throws to a target placed at different ranges and writing motions. Muscle activity was recorded using wireless EMG surface electrodes, and motion was captured using a Vicon system.

EMG batch processing tool

A tool for processing raw EMG data for an arbitrary number of subjects and trials.

Automatizing industrial tasks with stäubli RX90 and PUMA robots

The project consisted in programming serial robots for various tasks: depalletizing, gluing along square trajectories, and tracking objects on a conveyor beam with sensors.

ARACHNIS GUI

A graphical user interface for the mechanical design of cable-driven parallel robots.

Design of a 3-DoF planar parallel robot

This work consisted in the design of a parallel manipulator given a desired motion pattern and a set of priorities, such as desired positional workspace, rotational range, and error.

Toolbox: Simulation of the kinematics and sensors of mobile robots

A MATLAB/Simulink toolbox for the simulation of mobile robots and their sensors during localization and control applications.

Skills

Programming **Expert**: MATLAB, LaTeX. **Advanced**: V+, Val II. **Intermediate**: C++, Python.

Software **Expert**: Simulink. **Advanced**: V-rep, SimMechanics, Autodesk Inventor, CATIA, SolidWorks. **Basic**: Vicon Blade, Mokka, EyesWeb, Mastercam, SYMORO.

Honours, Awards & Seminars

2016 Speaker at the "International girls in ICT day event" at CONATEL, International Telecommunications Union, Honduras.

2016 Speaker at an event organized by IEEE/WIE (Women In Engineering), UNITEC, Honduras.

2016 Speaker at the event "Just like robotics, you have a great future", École Centrale de Nantes, France.

2012 Winner Fondation Centrale Scholarship, France.

2012 Speaker at CIC Bank's end of year ceremony at *Les Invalides*, France.

2006 Participant at Harvard University's HACIA Democracy, "Bridging the Digital Divide", Committee of Science and Technology, Panama.

Languages

Spanish (Native), **English** (Bilingual), **French** (Advanced,TEF:C1) and **Italian** (Intermediate:B2)

Other Interests: Music & Volunteering

1997 – Now Pianist (Courses until 2011 at Ars Nova Conservatory with Asha Santwan).

2006 – 2011 Volunteer at "Ilama Center for Women", Honduras.

2006 – 2007 Math and science teacher at "Los Sauces" school for girls, Honduras.