Miguel Xochicale

Curriculum Vitae – November 2018

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Statements

Personal Statement I am always pushing myself to be at the last known barrier of knowledge. I am a propositive, independent, curious and very stubborn person. My mission in life is to contribute with machines and algorithms that are able to have better understanding of their surrounding and therefore be able to help other people and to create better world conditions.

Research Interests I am interested in the fields of Human-Robot Interaction and Human Activity Recognition. My scientific mission is to intuitively understand and to apply tools from nonlinear dynamics, chaos theory and deep learning in order to perform automatic quantification of variability in different contexts.

Education

11/2014 – 11/2018 **Ph.D. in Human-Robot Interaction**, *University of Birmingham*, UK.
Thesis: Nonlinear Analyses to Quantify Movement Variability in Human-Humanoid Interaction.
Supervisors: Professor Chris Baber and Professor Martin Russell
Submission Day: 26th October 2018

09/2004 – 09/2006 **M.Sc. in Signal Processing**, *National Institute of Astrophysics, Optics and Electronics*, México.
Thesis: Digital Filter FIR with less multipliers
Supervisor: Dr. Gordana Jovanovic Dolecek

08/1999 – 09/2004 **B.Eng. in Electronics**, *Instituto Tecnológico de Puebla*, México.
Thesis: Speed control for a two-degrees-of-freedom Robot in LabVIEW.
Supervisor: M.Sc. José Esteban Torres León.

Publications

Peer-Reviewed

[OA] Xochicale M and Baber C. *Towards the Analysis of Movement Variability in Human-Humanoid Imitation Activities*. Bielefeld, Germany, October 2017. The 5th International Conference on Human Agent Interaction (HAI2017).

[OA] Xochicale M, Baber C, and Oussalah M. *Analysis of the Movement Variability in Dance Activities using Wearable Sensors*. Segovia, Spain, October 2016. The 2nd International Symposium on Wearable Robotics (WeRob16).

[OA] Xochicale M, Baber C, and Oussalah M. *Understanding Movement Variability of Simplistic Gestures Using an Inertial Sensor*. Oulu, Finland, June 2016. The 5th ACM International Symposium on Pervasive Displays.

[OA] Xochicale M, Baber C, and Oussalah M. *Towards the Quantification of Human-Robot Imitation Using Wearable Inertial Sensors*. Vienna, Austria, March 2017. The 12th Annual Conference on Human-Robot Interaction (HRI2017).

Xochicale M and Jovanovic-Dolecek G. *A New Method for Design Narrow Band Lowpass FIR Filters Using a Scale Function*. Veracruz, Mexico, November 2006. The 2nd International Conference on Electronic Design, Proc. edited by Victor Champac at all, ISBN 968-9085-01-8, pp.85-89.

Preprints

[OA] Xochicale M and Baber C. *Strengths and weaknesses of Recurrence Quantification Analysis in the context of human-humanoid interaction*. October 2018. ArXiv e-prints.

Non-Peer Reviewed

[OA] Xochicale M and Baber C. *Quantifying the Inherent Chaos of Human Movement Variability* . Madrid, Spain, June 2018. 15th Experimental Chaos and Complexity Conference (ECCC15).

[OA] Xochicale M and Baber C. *Towards the Analysis of Movement Variability for Facial Expressions with Nonlinear Dynamics*. Glasgow, Scotland, UK, April 2018. The 7th Consortium of European Research on Emotion Conference (CERE2018).

Teaching Experience

08/2014–04/2018 **Teaching Associate**, *University of Birmingham*, UK.
(01/2018–04/2018) Engineering Maths 2. Lecturers: Professor Martin Russell, Dr Carl Anthony
(08/2017–12/2017) Engineering Maths 2. Lecturer: Professor Martin Russell
(08/2017–12/2017) Computing for Engineering. Lecturer: Dr Sridhar Pammu
(01/2017–04/2017) Matlab Laboratories. Lecturer: Dr Edward Tarte
(08/2016–12/2016) Computing for Engineering. Lecturer: Dr Sridhar Pammu
(08/2014–12/2014) Small Embedded Systems. Lecturer: Professor Chris Baber

08/2013–12/2013 **Invited Lecturer**, *Bilingual Hight School at TECMilenio University*, Puebla, México.
Courses: Information Technology, Euclidian Geometry and Microsoft Office Access

Spring 2012 – Autumn 2012 **Invited Lecturer in Mechatronic Engineering**, *Universidad Madero*, Puebla, México.
Courses: Fundamentals of Automation, Industrial Electronics, Research Projects, Metrology, Physics, Computer Integrating Manufacturing, and Power Electronics

Spring 2007 – Spring 2012 **Invited Lecturer in Electronic Engineering**, *Universidad Iberoamericana Puebla*, México.
Courses: Stochastic Processes Course, Digital Signal Processing and Analog Filters.

08/2006 – 06/2007 **Invited Lecturer in Mechatronic Engineering**, *Instituto Tecnológico Superior de Atlixco*, México.
Courses: Electronics I, Numerical Methods, and Electricity and Magnetism. (January-June 2007.) Electricity and Magnetism, and Electricity and Industrial Electronics (August-December 2006)

Professional Experience

02/2013 – 08/2013 **Research Assistant**, *INAOE's Robotics Laboratory*, México.
Achievements: I developed a Human-Robot Interaction Demo for dancing activities based on a Patrolbot mobile robot and a ZSTAR3 Radio Frequency single three-axial accelerometer. For the demo, I explored four hand gestures where user's worn the accelerometer at his/her left wrist in order to create simple dance activities with the mobile robot.

01/2012 – 01/2013 **Invited Lecturer**, *Universidad Madero*, Puebla, México.
Achievements: I proposed and supervised the following students' projects: Haptic Referee Glove, Lightmetre and Pychometre using Arduino, Smart Irrigation, Persistent Of Vision Bicycle Wheel and a Delta Robot Structure. Additionally, I proposed and designed a Mechatronic Laboratory which includes: (i) a benchmark for laboratories in mechatronics in México and Puebla, (ii) a 3D layout design and (iii) minimal requirements of hardware and software for the laboratory.

09/2003 – 03/2004 **Research Internship**, *INAOE*, México.
Achievements: I implemented a speed control for a two-degree-of-freedom robot with microcontrollers PIC 16F84 and 16F877 that made communication via RS-232 using Virtual Instruments on LabVIEW.

Awards and Honours

11/01/2017 My work "Towards Healthy Ageing with Humanoid Robots" was selected for a talk at the second forum of Mexican Talent, Innovation Match MX 2017,

16-18/06/2016 I won a shared first prize for presenting one of the two best posters at the XIV Symposium of Mexican Students in the UK at University of Edinburgh.

20-24/07/2015 My project of a low-cost robot was selected among 125 applications received from 35 countries and presented at the first international public entrepreneurship program in Mexico (MECATE 2015).

11/2014-11/2018 Ph.D. scholarship by the Mexican National Council on Science and Technology.

25-27/05/2013 Markovito's team won the first place at the Mexican Tournament of Robotics 2013 in the category at HOME where I presented a Human-Robot Interaction Dance Demo.

09/2004-09/2006 M.Sc. scholarship by the Mexican National Council on Science and Technology.

Technical Skills

General Single-board computers and microcontrollers (RaspberryPi, BeagleBone, Arduino and PIC), Inertial Measurement Units (calibration, collection and data analysis), Artificial Neural Networks (e.g. TensorFlow and PyTorch), Graphic design (Inkscape, GIMP), and Web design (Jekyll).

Programming R, python, Robot Operating System (ROS), C, C++, Processing, LaTeX, the shell, vim, GNU-emacs, GNU-Octave (or MatLab), and open-source enthusiast at GitHub (@mxochicale).

Scientific Engagement

08/2014–06/2018 **At University of Birmingham, UK**.
(05-2018) Finalist at the Three Minute Thesis Competition 2018. Video: and GitHub: .
(2015–2018) Research Poster Conference for (2015) , (2016) , and (2018) . GitHub: .
(2014–2018) Presenting Demos of Human-Robot Interaction at the Undergraduate Open Days. GitHub: .
(2017–2018) Coordinator of the Science Seminars for the Mexican Society. GitHub: , Website: .

2017–2018 **Contributor and webmaster of Machine Learning for Mexico**, GitHub: , Website: .