Miguel Xochicale

Curriculum Vitae – May 2020

Personal Details & Contact

Full name Miguel Angel Pérez Xochicale
Date of birth 29-09-1981
Citizenship Mexican

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Personal statement

I have passion for Robotics, Chaos, AI, Brains and Open Science. I am currently pushing forward the state-of-the-art of ultrasound-guided procedures by making scientific contributions to new algorithms, software and hardware. I have 21 years' experience in human-robot interaction, electronics, mechatronics and signal processing, along with 13 years' experience as a teaching assistant in Mechatronic and Computer Engineering.

Education

11/2014 – 11/2018 **Ph.D. in Computer Engineering**, *University of Birmingham*, UK.
Thesis: Nonlinear Analysis to Quantify Movement Variability in Human-Humanoid Interaction.
Supervisors: Professor Chris Baber and Professor Martin Russell
Thesis submission: 26/10/2018. Passed Viva: 11/01/2019. Awarded PhD degree: 12/07/2019.
I published the first Open Access and 100% reproducible PhD Thesis since the establishment of University of Birmingham in 1900. Thesis: Github: Website:

09/2004 – 09/2006 **M.Sc. in Signal Processing**, *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**, *Puebla Institute of Technology*, México.
Thesis: Speed control for a two-degrees-of-freedom Robot in LabVIEW.
Supervisor: M.Sc. José Esteban Torres León.

Professional Experience

04/2019 – present **Research Associate in Software and Hardware Engineering**, *King's College London*.
Achievements: In the context of Ultrasound Needle Tracking, I am developing validation experiments with linear stages under Windows and GNU/Linux OS, designing electronic PCBs, characterising ultrasonic transducers, and contributing to real-time tracking software based on Python language via GitHub. All the previous activities in collaboration with an amazing team of renowned clinicians, engineers and researchers in KCL and UCL. Additionally, I am leading the preparation of two manuscripts.

02/2013 – 08/2013 **Research Assistant in Robotics**, *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. (Documents and code:).

01/2012 – 01/2013 **Lecturer in Mechatronic Engineering**, *Universidad Madero*, Puebla, México.
Achievements: I proposed and supervised the following students' projects: Haptic Referee Glove, Lightmetre and Pychometre Sensors, Smart Irrigation, Persistent Of Vision Bicycle Wheel and a Delta Robot Structure (see documentation and code:). 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 (see documentation and layout:).

09/2003 – 03/2004 **Research Internship in Robotics**, *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.

Open Access Publications (OA). [ORCID ID: 0000-0002-8225-7517]

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).

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. *Quantification of Dynamic Facial Expressions with Shannon Entropy in Human-Humanoid Interaction*. London, UK, February 2019. 1st Symposium on Machine Learning and Dynamical Systems (MLDS2019).

[OA] Xochicale M. *Quantifying Movement Variability with Nonlinear Dynamics for Human-Humanoid Interaction*. London, UK, June 2019. 25th International Conference on Difference Equations and Applications (ICDEA2019).

[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

01/2020–04/2020 **Teaching Associate**, *King's College London*, UK.
(01/2020–04/2020) Medical Robotics. Lecturer: Christos Bergeles

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 **Teaching Associate**, *Bilingual Hight School TECMilenio University*, Puebla, México.
Information Technology, Euclidian Geometry and Microsoft Office Access

2012 **Teaching Associate in Mechatronic Engineering**, *Universidad Madero*, México.
Fundamentals of Automation, Industrial Electronics, Research Projects, Metrology, Physics, Computer Integrating Manufacturing, and Power Electronics

2007 – 2012 **Teaching Associate in Electronic Engineering**, *Universidad Iberoamericana Puebla*, México.
Stochastic Processes, Digital Signal Processing and Analog Filters.

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

Technical Skills

General — GNU/Linux Operating System user (e.g. OpenSuse, Debian and Ubuntu)[2005-present] Single-board computers and microcontrollers (e.g. NVIDIA Jetson Nano, RaspberryPi, BeagleBone, Arduino and PIC)[2010-present], Inertial Measurement Units (e.g. calibration, collection and data analysis)[2013-present], Graphic design (e.g. Inkscape, GIMP)[2014-present], Web design (e.g. Github pages, Jekyll)[2015-present], and Artificial Neural Networks (e.g. TensorFlow and PyTorch)[2017-present].

Programming — Python[2014-present], R[2013-present], Robot Operating System (ROS)[2016-present], GNU-Octave (or MatLab)[2009-present], LaTeX[2006-present], C and C++[2015-present], Processing[2012-present], the shell[2010-present], GNU-emacs[2010-present], vim[2016-present], pandoc[2017-present], open-source enthusiast at GitHub (@mxochicale)[2015-present], and learning continuous integration and continuous delivery [2019-present].

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 the best poster award 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.

Extra Activities

04-2019 – present — **Outreach activities and scientific engagement**, *King's College London, UK.*
(02-2020 – 06-2020) Alexandra Lautarescu and I are organising the Reproducible, Interpretable, Open, & Transparent Science Club at St Thomas' Hospital
(20-08-2019) In2ScienceUK: sharing my scientific journey to young scientist on how they can become better scientist.
(09-2019) New Scientist Live: showcasing software segmentation that helps doctors to create 3D models of brain tumors using AI.

2013 – present — **Founder of LibrE Robotics**, *a non-profit organization aiming to freely transfer knowledge in Robotics to Mexican children*, GitHub: , Website: .
(2019–present) Artificial Intelligence and Robotics for Children (air4children) GitHub: Slides:

2017 – 2018 — **Developer of Machine Learning for Mexico**, GitHub: , Website: .

08/2014 – 06/2018 — **Outreach activities and scientific engagement**, *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: .