

STEPHEN SINCLAIR

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INTRODUCTION

As a programmer and scientist, I have worked throughout my career on high tech projects crossing disciplinary boundaries. My academic background in computer science, music technology and haptics, has given me a strong skill set at the intersection of signal processing, real-time systems, machine learning, simulation, and robotics.

PROJECT EXPERIENCE

Audio/Sound *Research and development*

- Live mixing software for DJing (personal project).
- Co-author: *libmapper*, decentralized musical networking. C and bindings for Python, Java, Max.

AI/Machine Learning *Research and development*

- Real-time plugin for AI-driven virtual reality audio (Enosis VR, 2018–2019). C++: Unity, Unreal.
- Adversarial autoencoders for audio synthesis (Inria Chile, [article](#) published 2018). Python/TensorFlow.
- Convolutional neural network for volumetric image segmentation and deformation analysis for skin images (URJC), C++, Python/TensorFlow.

Participation European grant projects *Post-doc*

- “TouchDesign: a computational design approach to haptics”; co-authored IEEE journal article on ultrasound haptics, Haptics Symp. 2020 (URJC Madrid).
- “Wearhap: wearable haptics for humans and robots”; co-authored most-cited article in IEEE Trans. on Haptics of 2018 (UPMC Paris).

Haptics *Research and development*

- Optimization-based algorithms for control of an ultrasound haptic device (URJC), C++, Python.
- Force sensors (design, electronics) for use with a skin tomography experiment (URJC).
- Displacement triggers for a fingerpad tribometry experiment; integral participation in ideation and data analysis (UPMC). Real-time Linux, scientific Python.
- Haptic interaction with violin simulation, optimization of velocity estimation filters (PhD project, 2007–2012), C++, embedded DSP, integrated new sensor.
- 3D physics environment for haptic interaction with creative tools (Master’s project, 2003–2005), C++.
- Drivers for a 6-DOF haptic serial arm; kernel I/O, kinematics, API maintenance, calibration GUI, Linux and Windows (MPB Technologies Inc.) C++, Java, real-time Linux.

Robotics simulation *Research and development*

- Integration of dynamical systems engine Siconos with Gazebo simulator (Inria Chile). C++, Python.

EMPLOYMENT HISTORY

- Uni. Rey Juan Carlos, Madrid (2018–2019)
- Inria Chile (2015–2018)
- Institut des Systèmes Intelligentes et de Robotiques, UPMC, Paris (2013–2015).

- Grad student, McGill University (2005 – 2012)
- MPB Technologies Inc. (1998–2010 summers/part time, 2004 full time).

EDUCATION

McGill University Montreal, Canada

PhD, 2007–2012 / Master’s, 2005–2007

Thesis topic Audio-haptic interaction; Real time simulation on embedded DSP, sensors and sensor fusion, optimization, calibration and data analysis, psychophysical experiments.

Other Projects *The Digital Orchestra*, creation and mapping of digital musical instruments · *Emerge*, clustering and mapping of crowd mobile phone sensors for aggregated control of live digital media.

Master’s thesis Haptics and rigid body environments for creative tools.

Concordia University Montreal, Canada

B.CompSci w/ minor Psychology, 2001–2004

LANGUAGE SKILLS

English (native), French (fluent), Spanish (fluent), Dutch (very basic, currently learning).

SELECTED PEER-REVIEWED PUBLICATIONS

- Héctor Barreiro, Stephen Sinclair and Miguel A. Otaduy. “Path Optimization for Spatiotemporal Ultrasound Rendering.” *IEEE Transactions on Haptics*. 2020, (early access).
- Séreña Bochereau, Stephen Sinclair, and Vincent Hayward. “Perceptual Constancy in the Reproduction of Virtual Tactile Textures With Surface Displays.” *ACM Trans. Applied Perception*. 2018 Apr 26;15(2):10.
- Joseph Malloch, Stephen Sinclair and Marcelo M. Wanderley. “Generalized Multi-Instance Control Mapping for Interactive Media Systems”. *IEEE MultiMedia* 25, no. 1 (2018): 39-50.
- Pacchierotti et al., “Wearable Haptic Systems for the Fingertip and the Hand: Taxonomy, Review, and Perspectives.” *IEEE Transactions on Haptics*, (10)4:580–600, May 2017.
- Sinclair, Wanderley and Hayward, “Velocity estimation algorithms for audio-haptic simulations involving stick-slip.” *IEEE Transactions on Haptics*, (7)4, October 2014.

OPEN-SOURCE CONTRIBUTIONS

- Co-Author: *libmapper*, decentralized network mapping of device signals (C/C++/Python/Java).
- Author: *DIMPLE*, force-feedback interaction with rigid-body simulator (C++).
- Author: *Loopdub*, software for live performance of loop-based music (C++).
- Maintainer: *LibLo*, a lightweight C API for Open Sound Control (C, POSIX+Windows).
- Co-maintainer: *RtAudio*, *RtMidi*, cross-platform audio and MIDI device abstraction libraries (C++).
- Debian package maintainer: Keras (deep learning), Lasagne (deep learning), Siconos (simulation).
- Repositories: github.com/radarsat1, gitlab.com/sinclairs