SERGIO DANIEL HERNANDEZ CHARPAK

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French ◦ Colombian

Education

École Polytechnique Fédérale de Lausanne — Lausanne, **Switzerland**
Electrical Engineering, PhD Candidate — *September 2020 - Present*
.NeuroRestore

École Polytechnique Fédérale de Lausanne — Lausanne, **Switzerland**
Computational Science and Engineering, Master Thesis Student — *September 2017 - February 2020*

Universidad de los Andes — Bogotá, **Colombia**
Physics, Bachelor of Science — *January 2010 - March 2017* - GPA **4.23**/5.00
Computing Engineering, Bachelor of Engineering — *January 2010 - March 2017* - GPA **4.23**/5.00
Japanese Language and Culture, Minor

Kyoto Institute of Culture and Language — Kyoto, **Japan**
Intermediate Japanese Student — *October 2013-March 2014*

Lycée Français Louis Pasteur — Bogotá, **Colombia**
Student — *Graduated, July 2009*

Work Experience

École Polytechnique Fédérale de Lausanne (EPFL)
.Neurorestore - Defitech Center for Interventional Neurotherapies
Lausanne, Switzerland
September 2020 - Present

Doctoral Assistant – .Neurorestore – Clinical Division
Automatization of the generation of personalized 3D FEM models for simulations of spinal cord stimulation paradigms for patients suffering spinal cord injury or other neurological dysfunctions. Solving functional and anatomical variabilities on humans using computational and data analysis perspectives under the supervision of prof. *G. Courtine* and prof. *J. Bloch*

École Polytechnique Fédérale de Lausanne (EPFL)
G-Lab
Geneva, Switzerland
February - September 2020

Scientific Assistant – Neurorestore – Computational Neuroscience Unit
Contributing with image processing, data analysis in several research projects around personalized targeted spinal cord stimulation paradigms for spinal cord injury patients.

Nagra Kudelski Group
Cloud
Cheseaux, Switzerland
February – July 2019

Internship – Cloud Infra Team
Enabled real-time deep learning in production for anomaly detection in data streams using Pytorch, TF, Scala, Spark and Deeplearning4J. Developed neural networks models for unsupervised anomaly detection on time series deploying them for real time alert generation under supervision of eng. *Arnaud Gaillard*.

Research Experience

École Polytechnique Fédérale de Lausanne (EPFL)
G-Lab & MIP Lab
Geneva, Switzerland
September 2019 - February 2020

Master Thesis - Prof. Courtine's Laboratory & MIP Laboratory (prof. Van De Ville)
Conducted a lumbar Spinal Cord (SC) fMRI study to deconstruct segmental innervation of sensorimotor circuits in the lumbosacral SC in healthy. Integrated it into personalized targeted SC stimulation paradigms for patients under the direction of PhD students A. Rowald, N. Kinany, prof. *G. Courtine* and prof. *D. Van De Ville*.

École Polytechnique Fédérale de Lausanne (EPFL)
G-Lab
Geneva, Switzerland
August 2018 – February 2019

Master Semester Project - Prof. Courtine's Laboratory
Artificially represented brain input to spinal sensorimotor circuits through the implementation of a DL framework for unsupervised and supervised learning strategies to drive a biomechanical model of the lower limbs in human under the direction of PhD student *A. Rowald* and prof. *Gregoire Courtine.*

École Polytechnique Fédérale de Lausanne (EPFL)
MIP Lab
Geneva, Switzerland
February - July 2018

Master Semester Project - Medical Image Processing Laboratory
Processed high resolution 7-Tesla 1-TR fMRI data FMRI data using the Total Activation method, and found the innovation-driven Co-Activation Patterns (iCAPs) and their time behaviors on three different paradigms. Worked under the direction of PhD student A. Tarun and prof. *Dimitri Van De Ville*.

Universidad de los Andes
Department of Computing Engineering
Bogotá, Colombia
August - December 2016

Undergraduate Thesis
Implemented part of an Image Analysis tool for the Segmentation of the aorta artery for applications such as the quantification of the elasticity of the aorta artery and quantification of the aorta artery calcifications under the direction of prof. *Marcela Hernandez* and prof. *Leonardo Florez*.

Laboratoire CPPM
LSST Project
Marseille, France
June 2016

Internship - LSST Project
Studied and implemented different image processing and statistic techniques for the detection of transients in astrophysical images. Under the supervision of scientist *Dominique Fouchez*.

Universidad de los Andes
Department of Physics
Bogotá, Colombia
January - May 2016

Undergraduate Thesis
Titled *Laniakea in a Cosmological Context*. Detected galaxies superclusters in simulated cosmological structures based on galaxies velocities properties under the direction of prof. *Jaime E. Forero*.

Universidad de los Andes
School of Engineering
Bogotá, Colombia
August 2015 - December 2016

Undergraduate Research Assistant
Developed Python tools for testing prototypes in the project Astronomical Image processing from large all-sky photometric surveys for the detection and measurements of transients under the mentorship of prof. *Marcela Hernandez*.

Fermi National Laboratory
Neutrino Division
Batavia, U.S.A.
June –July – August 2015

IPM Intern – Muon G-2 Experiment
Part of the team for the Test Beam of a Straw Detector Prototype in charge of the High Voltage and assisted with the analysis of the data taken under the mentorship of scientist *Brendan C Casey*.

Tokyo University of Marine Science and Technology
Tokyo, Japan
May -June 2014

Visiting Student - Control and Robotics Laboratory
Assisted with the integration and control of a helicopter with Arduino under the supervision of professors *Sho* and *Ito*.

Teaching Experience

Universidad de los Andes
Bogotá, Colombia
2011,2012,2013,2014,2015

Undergraduate Teaching Assistant
Teaching Assistant for Object Oriented Programming, Data Structures, Modeling, Simulation and Optimization, and Computational Methods courses.

Publications and Conferences

Squair, Jordan W., Maxime Berney, Mayte Castro Jimenez, Nicolas Hankov, Robin Demesmaeker, Suje Amir, Aurelie Paley, **Sergio Hernandez-Charpak**, et al. "Implanted System for Orthostatic Hypotension in Multiple-System Atrophy." **New England Journal of Medicine** 386, no. 14 (April 7, 2022): 1339–44. https://doi.org/10.1056/NEJMoa2112809.

Rowald, A., Komi, S., Demesmaeker, R., Baaklini E., **Hernandez-Charpak S.D**., et al. Activity-dependent spinal cord neuromodulation rapidly restores trunk and leg motor functions after complete paralysis. **Nat Med** 28, 260–271 (2022). https://doi.org/10.1038/s41591-021-01663-5

J D Peñaranda-Rivera, D L Paipa-León, **S D Hernández-Charpak**, J E Forero-Romero, Superclusters from velocity divergence fields, **Monthly Notices of the Royal Astronomical Society: Letters**, Volume 500, Issue 1, January 2021, Pages L32–L36, https://doi.org/10.1093/mnrasl/slaa177

XV LARIM (Latin American Regional IAU Meeting)
Cartagena, Colombia
October 2016

Oral Talk - Laniakea in a Cosmological Context
Detected galaxies superclusters in simulated cosmological structures based on galaxies velocities properties under the direction of prof. Jaime E. Forero.

Skills

Software and programming

Proficient

Python, MATLAB, C, C++, Java, Git, LaTeX, Bash, Pytorch, Deeplearning4J, Spark, Scala

OS: Linux, Windows and Mac OS.

Github: https://github.com/sercharpak

Experienced

Sim4life, Tensorflow, FLUENT, Javascript, HTML5, CSS, Firebase, Processing, Arduino, Assembler, UML, PHP, MPI, Neuron, Webots, Quantum Espresso

Languages

French (fluent) Spanish (fluent) English (fluent) Japanese (Intermediate, JLPT level 4-3)