Alejandro Hernández Cano

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WORK EXPERIENCE

[04/2024 – Current] **Intern**

ETH/Swiss National Supercomputing Centre

City: Zurich | **Country:** Switzerland

- Scale LLM training up to large numbers of nodes

[06/2023 – 04/2024] **Student assistant**

École Polytechnique Fédérale de Lausanne

City: Lausanne | **Country:** Switzerland

Link: https://github.com/epfLLM/Megatron-LLM

- Part of the Megatron-LLM and Meditron team.
- Meditron: Training, finetuning and evaluation of LLMs in the medical domain.
- Megatron-LLM: Distributed trainer of very large language models.

[09/2023 – 01/2024] **Student teaching assistant**

École Polytechnique Fédérale de Lausanne

City: Lausanne | **Country:** Switzerland

Teaching assistant of the 2023 edition of the machine learning course at EPFL.

[02/2023 – 04/2023] **Student assistant**

École Polytechnique Fédérale de Lausanne

City: Lausanne | **Country:** Switzerland

(Short job) Coordinate meetings between professors and students for EPFL's PhD visiting days

[01/2022 – 05/2022] **Student teaching assistant**

National Autonomous University of Mexico

City: Mexico City | **Country:** Mexico

Student assistant of the 2022 course “Graph and Game Theory”

EDUCATION AND TRAINING

[2022 – Current] **Master's Degree in Computer Science**

École Polytechnique Fédérale de Lausanne https://www.epfl.ch/schools/ic/

[2018 – 2022] **Bachelor's Degree in Computer Science**

National Autonomous University of Mexico
https://www.fciencias.unam.mx/

City: Mexico City | **Country:** Mexico |

LANGUAGE SKILLS

Mother tongue(s): Spanish

Other language(s):

English

LISTENING C1 **READING** C1 **WRITING** C1

SPOKEN PRODUCTION C1 **SPOKEN INTERACTION** C1

German

LISTENING B1 **READING** B1 **WRITING** B1

SPOKEN PRODUCTION B1 **SPOKEN INTERACTION** B1

French

LISTENING A2 **READING** A2 **WRITING** A2

SPOKEN PRODUCTION A2 **SPOKEN INTERACTION** A2

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

DIGITAL SKILLS

My Digital Skills

Programming Languages

Python | Julia | C/C++ | Scala | Haskell | Java | Wolfram

Tools

Python: Numpy, pytorch, transformers, tensorflow, pandas, matplotlib, scikit-learn, seaborn, rdkit | C++: Torch, eigen | Others: Git, latex, jupyter, godot, maven, make

Experience on

Machine learning | Natural language process | Deep learning | Hyperdimensional computing | Computational chemistry

PUBLICATIONS

[2024] **Hyperdimensional Computing with Holographic and Adaptive Encoder**

Reference: A. Hernández-Cano, Y. Ni, Z. Zou, A. Zakeri, M. Imani. Frontiers in Artificial Intelligence 2024.

[2023] **MEDITRON-70B: Scaling Medical Pretraining for Large Language Models**

Reference: Z. Chen, A. Hernández-Cano, A. Romanou, A. Bonnet, K. Matoba, et al. ArXiV Preprint 2023.

[2023] **Privacy-Preserving Neural Representation for Brain-Inspired Learning**

Reference: J.R. Rubalcava-Cortés, A. Hernández-Cano, et. al. DATE 2023

Link: https://gitlab.com/biaslab/bipodhd

[2023] **Modifications in the piperazine ring of nucleozin affect anti-influenza activity**

Reference: E. Correa-Padilla, A. Hernández-Cano, et. al. PLoS One 2023

[2021] **Molecular de novo design using context-free grammars**

Reference: A. Hernández-Cano, J. Naveja-Romero, A. Madariaga-Mazon, K. Martinez-Mayorga. ACS Fall 2021

Featured in Sci-Mix session: Sci-Mix is a poster session hosting the most exceptional abstracts submitted to participating divisions in the conference.

[2021] **PRID: Model Inversion Privacy Attacks in Hyperdimensional Learning Systems**

Reference: A. Hernández-Cano, R. Cammarota, M. Imani. DAC 2021

[2021] **RegHD: Robust and Efficient Regression in Hyper-Dimensional Learning System**

Reference: A. Hernández-Cano, M. Zhou, C. Zhou, X. Yin, M. Imani. DAC 2021

[2021] **A Framework for Efficient and Binary Clustering in High-Dimensional Space**

Reference: A. Hernández-Cano, Y. Kim, M. Imani. DATE 2021

Link: https://gitlab.com/biaslab/hd-clustering

[2021] **Real-Time and Robust Hyperdimensional Classification**

Reference: A. Hernández-Cano, C. Zhuo, X. Yin, M. Imani. GLSVLSI 2021

Link: https://gitlab.com/biaslab/onlinehd

[2021] **OnlineHD: Robust, Efficient, and Single-Pass Online Learning Using Hyperdimensional System**

Reference: A. Hernández-Cano, N. Matsumoto, E. Ping, M. Imani. DATE 2021

Link: https://gitlab.com/biaslab/onlinehd

[2020] **Sleep staging by hyperdimensional dense networks**

Reference: L. Hernández-Cano, A. Hernández-Cano, A. Leonor-Rivera. AIP 2020

HONOURS AND AWARDS

[2022] **Hackathon - Second place Awarding institution:** LauzHack 2022

Minimum viable product: Q0 is an adaptive online learning tool designed to curate tailored course plans for individuals seeking to learn a new skill.

Link: https://www.alehc.com/projects/q0/

[2020] **Best Student Paper - Second place Awarding institution:** XVI Mexican Symposium on Medical Physics

OTHER FELLOWSHIPS AND ACTIVITIES

[2023 – 2023] **EPFL's Megatron-LLM**

Lead of the EPFL's Megatron-LLM project: A large language model distributed trainer.

- Fork of NVIDIA's Megatron-LM trainer.
- Contributed with key extra functionality including LLaMa architecture support, grouped query attention, rotary position embeddings, conversational finetuning pipeline, and more.

Link: https://github.com/epfLLM/Megatron-LLM

[2023 – 2023] **EPFL's Meditron**

Meditron is the world's best performing open source Large Language Model tailored to the medical field.

- Key contributor, responsible of model training and finetuning.
- Helped with data pipeline and evaluation.

Links: https://arxiv.org/abs/2311.16079 | https://github.com/epfLLM/meditron

[2023 – 2023] **Experimenting ways to make transformer LLMs more efficient using early exit, École Polytechnique Fédérale de Lausanne**

Semester project supervised by Prof. Martin Jaggi, MLO lab.

[2020 – 2022] **Work in various projects, Institute of Chemistry, National Autonomous University of Mexico**

Helped in a few research projects and other activities in the UNIQUIC lab, under supervision of Prof. Karina Martínez Mayorga.

[2020 – 2022] **Work in various projects, University of California, Irvine**

Worked in several research projects in the BIASLab, under supervision of Prof. Mohsen Imani.

[2020] **Teacher of the Introduction to Machine Learning course, Institute of Chemistry, National Autonomous University of Mexico**

Teacher of 10-hour introductory course, presented online to students of the Institute of Chemistry.

[2019] **ENLACE, University of California San Diego**

Summer Research program for high-school and bachelor students, under supervision of Prof. Tajana Rosing, SEELAB.