Pablo Lara
Bday. 20 Apr. 1989
pablo.elara@ieee.org

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About me: My interest deals with seismic analysis through earthquake seismology, signal processing and measurement techniques, using artificial intelligence in order to search patterns. New instrumentation displays huge time-series data, my hypothesis is that Artificial Intelligence is an amazing tool to understand, find evidences, and estimate parameters in a fast and precise way. I develop models based on artificial intelligence (deep learning, machine learning, etc.) applied to seismology, also in forecasting. I developed the Early Warning System algorithm for Peru, which is called E3WS. It can be applied anywhere, and uses only the first 3 seconds of an earthquake recorded by a single sensor.

Education

2020 - present, Université Côte d'Azur, France
PhD program in Earth and Universe Sciences
Doctoral School of Fundamental and Applied Sciences
Building dissertation: Detection of seismological signals based on artificial intelligence.
Submitted article: Earthquake Early Warning using 3 seconds of records on a single station. Journal: JGR Solid Earth.
Expected dissertation defense: September 2024.

2018 - 2020, Universidade Federal do Ceará, Brazil
Master of Science in Electrical Engineering and Computer Science
Public dissertation: "Automatic multichannel volcano-seismic classification using Machine Learning and EMD"
url: http://www.repositorio.ufc.br/handle/riufc/51894

2017, Universidad Nacional de Ingenieria, Peru
Diploma Electrical Engineer (Public thesis defensed)
Public thesis: "Design of a monitoring system for the satellite seismic network of Peru in real-time", approved with distinction
url: http://cybertesis.uni.edu.pe/handle/uni/13260

2007 - 2014, Universidad Nacional de Ingenieria, Peru
Diploma of Bachelor degree in Electrical Engineering. BAC+5

Main publications

P. Lara, Q. Bletery; J. P. Ampuero; A. Inza, H. Tavera, Earthquake Early Warning Starting From 3 s of Records on a Single Station With Machine Learning, Journal of Geophysical Research: Solid Earth, 2023.

E. Calais, S. Symithe, T. Monfret, B. Delouis, A. Lomax, F. Courboulex, J. P. Ampuero, **P. Lara**, Q. Bletery, J. Chèze et al., Citizen seismology helps decipher the 2021 Haiti earthquake, Science, 2022.

A. Teixeira, C. Rolim, **P. Lara**, A. Inza, J. Mars, J. P. Metaxian, M. Dalla Mura, M. Malfante, Tensor-Based Learning Framework for Automatic Multichannel Volcano-Seismic Classification, IEEE, 2021.

P. Lara, C. Rolim, A. Inza, J. Mars, J. P. Metaxian, M. Dalla Mura, M. Malfante, Automatic Multichannel Volcano-Seismic Classification Using Machine Learning and EMD, IEEE, 2020.

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Professional experience

Mar 2020 - Sep 2023, *Artificial intelligence researcher*, Instituto Geofisico del Peru. IGP & IRD Convention

Main achievements:

- Design the Peruvian Earhquake Early Warning System (SASPe), based on artificial intelligence and 3s of P-wave, which detects earthquakes, pick the P-phase, and estimates magnitudes and hypocentral parameters in real-time.

Oct 2014 - Nov 2017, *Software engineer*, Geophysical Institute of Peru

Main achievements:

- Design of a monitoring system for the National Seismic and Accelerometric Network in real time.
  - Design a decoding system for instruments with Satellite and Internet telemetry.
  - Design a data acquisition system.
  - Design a monitoring platform to display the state of health of the remote stations.
  - Design an alert system to report the operational status of the stations.
- Design maps of intensities (ShakeMaps) in real time, when a seismic event occurs.
- Design a software that performs the Power Spectral Density for seismic noise.
- Design of monitoring software for servers that manage the National Seismic and Accelerometric Network in real time.

Lecturer

2023 September, *Poster*, ERC – TECTONIC Workshop

E3WS: Earthquake Early Warning starting from 3 seconds of records on a single station with machine learning, Rome, Italy.

2022, *Oral presentation*, American Geophysical Union

Earthquake Early Warning with 3 seconds of records on a single station, Chicago, USA.

2021 September, *Poster*, ERC – TECTONIC Workshop

Earthquake Early Warning System based on 3 seconds of P wave: a Machine Learning approach for rapid detection, estimation magnitude and location, Rome, Italy.

2020 December, *Poster*, American Geophysical Union

Efficient P-wave detection in real time for Earthquake Early Warning System based on Artificial Intelligence.

2020 December, *Oral presentation*, American Geophysical Union

Co-author: Sismo-volcano classification in real time based on Empirical Mode Decomposition (EMD) and Machine Learning.

2019 Winter, *Teaching*, Universidade Federal do Ceará

Pattern Recognition, Sobral, Brazil.

2018, *Oral presentation*, III Meeting of Information Technology

Subject "The Importance of Artificial Intelligence in Predicting Seismic events", Ieducare FIED University, Tianguá, Brazil.

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2018, *Oral presentation*, IV Cycle of Engineering Lectures
Subject "Telemetry Satelitale research perspectives in Brazil and abroad", Universidade Federal do Ceará, Sobral, Brazil.

Software Development Skills

Artificial Intelligence

- TensorFlow
- PyTorch
- Keras
- Scikit-learn

Programming

- C
- C++
- Python
- Bash
- C-Bash
- HTML
- PHP
- Matlab

Computer software

- MySQL
- MariaDB
- Linux
- MongoDB
- Clusters
- Supercomputers

Seismic software

- GMT
- Earthworm
- Seedlink
- Nanometrics
- Reftek
- Guralp
- Seiscomp3
- Proxmox VM

Languages

- Spanish, native language.
- English, advanced.
- Portuguese, advanced.
- French, basic.

Main awards

2020, *Doctoral Scholarship*, Institut de recherche pour le développement (IRD)
Scholarship awarded by the IRD for the preparation of the doctoral thesis on Detection of seismological signals based on artificial intelligence.

2018, *Master Scholarship*, OAS/GCUB
Scholarship awarded to the best research proposals thanks to the Organization of American States and the Coimbra Group of Brazilian Universities.

2001, *Second place*, UNI - PUCP - TRILCE - Peruvian Mathematical Society - International Commission of the Mathematics Olympics
Second place prize in the "National Mathematics Contest".

2001, *Second place*, TRILCE
Second place prize in the "6th Mathematics Olympiad".

2000, *First place*, National University of Santa
First place prize in the "I Mathematical Logic Contest".

2000, *First place*, Editorial Active School and Ministry of Education
First place award in the "VIII Mathematics Olympiad SIGMA 2000".

1997, *Honorable mention*, UNASAM
Prize for the first places of the "V Regional Mathematics Olympiad, Chavín Region".