



Pablo Lara

Bday. 20 Apr. 1989

pablo.elara@ieee.org

# Pablo Lara

**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 2023.

### 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 Ingeniería, Peru

Diploma Electrical Engineer (Public thesis defended)

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 Ingeniería, Peru

Diploma of Bachelor degree in Electrical Engineering. BAC+5

## Main publications

**P. Lara**, Q. Bletery; J. P. Ampuero; A. Inza, Earthquake Early Warning using 3 seconds of records on a single station, Preprint ESS Open Archive, Submitted in JGR Solid Earth, 2023.

E. Calais, S. Symithe, T. Monfret, B. Delouis, A. Lomax, F. Courboux, 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 - present, *Artificial intelligence researcher, Instituto Geofísico del Peru. IGP & IRD Convention***

Main achievements:

- Design the Peruvian Earthquake Early Warning System (SASPe), based on artificial intelligence and 3s of P-wave, which detects earthquakes, pick the P-phase, 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.

**Sep 2014, *Laboratory engineer, HIGSEG E.I.R.L.***

Calibration and verification of electronic measuring equipment such as Luxometers, Multiparameters, Gas meter O<sub>2</sub>, CO, H<sub>2</sub>S, SO<sub>2</sub>, LEL, Sound level meters, Dosimeters, Ionizing Radiation Equipment, Gravimetric Pumps.

## Lecturer

**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 Satelital 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".