

# eduardzorita

scientist, electrical/electronics & software engineer, bioinformatician

## contact



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github.com/ezorita

## languages

catalan

spanish

english

## programming

C & C++

python, Java

Matlab, R

PHP, JS-node, SQL

HTML, CSS

shell scripting

VHDL

L<sup>A</sup>T<sub>E</sub>X, git

AGILE

## skills

### computer science

algorithm design

machine learning

parallel computing

automated testing

databases

### electrical eng

signal processing

networks

microprocessors/FPGA

PCB design

microelectronics

control systems

### biology

bioinformatics

genomics

molecular biology

math

physics

statistics

## projects

starcode

horari sunion

## interests

**professional:** computer science, artificial intelligence, genomics, molecular biology.

**personal:** learning, teaching, photography, music, hiking, literature, sports and popular culture.

## experience

### Science & Engineering

2014–Now

#### Centre for Genomic Regulation (CRG)

Barcelona

*Research Scientist/Bioinformatician*

Research scientist at the Genome Architecture laboratory (Guillaume Filion). If all cells in a human body have the same genetic information, how come are they so different? The short answer is: they express different sets of genes. For instance, red blood cells produce haemoglobin and neurons need neuroreceptors. The goal of our team is to understand the mechanisms used by each cell type to selectively express and repress their genes.

**Research fields:** Computer science, statistics, artificial intelligence, genomics and molecular biology.

**Research projects:** gene regulation, HIV latency, 3D conformation of chromatin, genome alignment and assembly.

Lab website.

2013–2014

#### Applied Ocean Systems

San Diego, CA

*Electrical Engineer*

Communicating underwater is hard. Transmitting live video streams over underwater acoustic waves sounds almost impossible. In AOS we worked hard to design the first underwater wireless device capable of transmitting ultra-compressed video through acoustic broadband OFDM.

**Main responsibilities:**

- Research on cutting-edge underwater communication technology.
- Design of algorithms for acoustic signal synchronization & Doppler compensation.

2012–2013

#### AUV Lab @ Massachusetts Institute of Technology

Cambridge, MA

*Research Engineer*

Marine biologists and oceanographers need high-tech tools to explore the sea. Building them is the mission of the Autonomous Underwater Vehicle laboratory. The mission of our team of three engineers was to design and manufacture unmanned and remotely-controlled underwater vehicles, used in all sorts of scientific expeditions.

**Main responsibilities:**

- Onboard hardware and software design for autonomous underwater vehicles.
- Research on communication technologies for underwater vehicles.
- Development of autopilot and sensor drivers.

Department website.

- 2009–2010 **Signal Theory & Communications department @ UPC** Barcelona  
*Research assistant*  
 I worked as research assistant under the supervision of Prof. Josep Vidal. Our line of research focused on designing multi-antenna communication techniques for the 4G wireless standard.  
**Research topics:** wireless communications, signal processing, algebra, array processing (MIMO), convex optimization.
- 2009–2011 **Sunion ICC** Barcelona  
*Software Developer*  
 I developed a platform to create and publish dynamic weekly class schedules. The project was developed for a high-school based in Barcelona. The platform consists of a class schedule editor, database server, screen visualization system and mobile/web app.  
 ☞ Web/mobile app.

## Teaching

- 2015–2016 **School of Molecular and Theoretical Biology** Pushchino, Russia/Barcelona  
*Faculty*  
 I participated as faculty in two editions of the School of Theoretical and Molecular biology held in Pushchino, Russia and Barcelona on August 2015/2016, respectively.  
*Projects taught:*  
**Laboratory of DNA manipulation.** The students learned how to clone specific DNA sequences from major Eukaryote species in an actual molecular biology laboratory.  
**Laboratory of Yeast transformation.** The students learned how to make genetically modified yeast in an actual molecular biology laboratory.  
*Skills taught:*
  - Molecular biology.
  - Basic microbiology.
  - Basic bioinformatics.
  - DNA cloning.
  - Yeast culture and growth.
- 2015 **Bioinformatics, Laboratory Course** Universitat Pompeu Fabra, Barcelona  
*Human Biology degree*  
 I taught a laboratory project on basic bioinformatics. The students used basic bioinformatic tools and programming knowledge to identify selenoproteins through sequence analysis and protein structure prediction.
- 2010–2011 **Physics, Course I** Universitat Politècnica de Catalunya, Barcelona  
*Electrical Engineering degree*  
 I taught supplementary classes for an undergraduate course on Physics.  
 Teaching evaluation awards:
  - Most attended course.
  - Best attendee performance.

## education

- 2012–2013 **Research Engineer** Massachusetts Institute of Technology, Cambridge (MA)  
I was enrolled at the Department of Mechanical Engineering, where I conducted research on autonomous underwater vehicles and underwater wireless communications.
- 2011–2012 **MSc Thesis in Electrical Engineering** Northeastern University, Boston (MA)  
Master's Thesis at the Digital Signal Processing laboratory under the supervision of Milica Stojanovic: Underwater communications.  
The study was also supported by the Massachusetts Institute of Technology.  Thesis.
- 2011–2014 **MSc Electronics Engineering** Universitat Politecnica de Catalunya, Barcelona  
Main subjects: semiconductor physics, electronic and photonic devices, microelectronic layer design, FPGA/microcontroller systems design, feedback control circuits.  
 Thesis.
- 2006–2011 **BSc & MSc Electrical Engineering** Universitat Politecnica de Catalunya, Barcelona  
Main subjects: math, statistics/probability, physics, circuit theory, electronics, programming, computer architecture, communication theory, information science, antennas, networks, optical communications, advanced signal processing, machine learning, cryptography and digital security, quantum computing.
- 2008–2011 **BSc Physics** Universitat de Barcelona  
Degree not completed, 3 years out of 4 finished.  
Main subjects: math, mechanics, electromagnetism, thermodynamics, optics, quantum physics, relativity, particle physics.

## volunteering

- 2013–2015 **ALS palliative care** Fundacio Miquel Valls, Barcelona  
I provided weekly palliative care to patients with Amyotrophic Lateral Sclerosis, a fatal motor neuron disease.
- 2011 **Education through sport** Uvikiuta Organization, Tanzania, Africa  
We used sports and games to assist education and cultural exchange with primary school kids in Dar es Salaam, Tanzania.

## publications

### Journal articles

A new quinoline BRD4 inhibitor targets a distinct latent HIV-1 reservoir for re-activation from other 'shock' drugs

Erik Abner, Mateusz Stoszko, Lei Zeng, Heng-Chang Chen, Andrea Izquierdo-Bouldstridge, Tsuyoshi Konuma, Eduard Zorita, Elisa Fanunza, Qiang Zhang, Tokameh Mahmoudi, Ming-Ming Zhou, Guillaume J. Fillion, and Albert Jordan

*Journal of Virology* (2018). 2018

Using Barcoded HIV Ensembles (B-HIVE) for Single Provirus Transcriptomics

Chen Heng-Chang, Zorita Eduard, and Fillion Guillaume J.

*Current Protocols in Molecular Biology* 122.1 (2018) e56. 2018

Position effects influence HIV latency reversal

Heng-Chang Chen, Javier P. Martinez, Eduard Zorita, Andreas Meyerhans, and Guillaume J. Fillion

*Nature Structural & Molecular Biology* 24.1 (Jan. 2017) pp. 47–54. *Nature Publishing Group*, 2017

## Space-Frequency Block Coding for Underwater Acoustic Communications

E. Zorita and M. Stojanovic

*IEEE Journal of Oceanic Engineering* 40.2 (Apr. 2015) pp. 303–314. 2015

## Starcode: sequence clustering based on all-pairs search

Eduard Zorita, Pol Cuscó, and Guillaume J. Fillion

*Bioinformatics* 31.12 (2015) pp. 1913–1919. 2015

## Conference papers

### Space-frequency coded OFDM for underwater acoustic communications

E. Zorita and M. Stojanovic

*2012 Oceans*, 2012

### Network MIMO for downlink in-band relay transmissions with relaying phases of fixed duration

A. Agustin, J. Vidal, S. Lagen, and E. Zorita

*2011 19th European Signal Processing Conference*, 2011

### Network-MIMO backhauling for QOS-constrained relay transmission

J. Vidal, A. Agustín, S. Lagén, E. Zorita, O. Muñoz, A. Garcia Armada, and M. S. Fernández

*2011 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2011