eduardzorita

data scientist, electrical & software engineer, bioinformatician

contact

Eduard Valera Zorita

linkedin/eduardvalera

github.com/ezorita

languages

catalan
spanish
english

programming

C & C++
python, js
PyTorch, TF
Matlab, R
Mongo, SQL
HTML, CSS
shell scripting
VHDL
LaTeX, git

skills

computer science
algorithm design
machine learning/AI
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, ml/ai, teaching, genomics, molecular biology.
personal: learning, 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, artificial intelligence, statistics, 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:
- Reserach 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

2019–Now **MIT Professional Education/Emeritus Institute of Management** Boston, MA/Remotely
Course Leader
I teach Machine Learning and Artificial Intelligence in the following online courses:

- Machine Learning: From Data to Decisions (MIT)
- Postgraduate Diploma in Data Science (Emeritus)

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 introductory 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 Politecnica 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
Graduate Engineer 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 work 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, criptography 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

Spatially clustered loci with multiple enhancers are frequent targets of HIV-1 integration

Bojana Lucic, Heng-Chang Chen, Maja Kuzman, Eduard Zorita, Julia Wegner, Vera Minneker, Wei Wang, Raffaele Fronza, Stefanie Laufs, Manfred Schmidt, Ralph Stadhouders, Vassilis Roukos, Kristian Vlahovicek, Guillaume J. Filion, and Marina Lusic

Nature Communications *10.1 (Sept. 2019) p. 4059. 2019*

Calibrating seed-based alignment heuristics with Sesame

Guillaume J. Filion, Ruggero Cortini, and Eduard Zorita

bioRxiv *(2019). Cold Spring Harbor Laboratory, 2019*

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. Filion, and Albert Jordan

Journal of Virology *(2018). 2018*

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

Chen Heng-Chang, Zorita Eduard, and Filion 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. Filion

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. Filion

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