IGNACIO MARTÍN ARZUAGA GARCÍA

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DATA ANALYST AND QUANTITATIVE RESEARCHER

Analytical and solutions-driven professional with a structural engineering background and experience in data analytics, engineering design, and research (both numerical and experimental). With industry experience in structural analysis on aerospace, nuclear, and port engineering projects.

SKILLS

MIT Sloan's Business Analytics Certificate | Data Analytics | Python | R | MATLAB | Data Visualization: Tableau | Systems Dynamics: Vensim | Microsoft Office Suite (Word, Excel, PowerPoint) | Structural Analysis and Simulations: Abaqus, Femap/Nastran | AutoCAD | SketchUp | Spanish (native) | French (basic)

EXPERIENCE

MIT Department of Civil and Environmental Engineering · *Research Assistant*   June 2019 – Present
Cambridge, MA   September 2016 – September 2018

Conducted two research projects in parallel focused on geomechanics applications for energy systems, with laboratory experimentation and data postprocessing, in the Rock Mechanics group led by Prof. Herbert Einstein.

- Conduct experimental tests on interaction mechanisms between induced fractures and natural fractures in shale rock.
- Record and process real-time visualization of the fracturing process using High-Resolution pictures and High-Speed videos, combined with Acoustic Emissions (AE) measurements.
- AE data analyzed with MATLAB© through a peak-finding algorithm designed to identify peak signal arrivals.
- Digital Image Correlation (DIC) analysis through NCORR MATLAB© package.
- Fine tune Machine Learning (CNN) pre-trained model for crack detection from experimental pictures.

MIT Department of Nuclear Science and Engineering · *Research Assistant*   May 2021 – May 2023
Cambridge, MA

Participated as part of the structural analysis group in the SMR reactor feasibility project conducted by the Advanced Reactor Group led by Prof. Koroush Shirvan.

- Build a Machine Learning model from a large data set of discrete FEM simulations of an SMR reactor building generated with ABAQUS scripting.
- Evaluate structural design based on ASCE, ACI, and AISC criteria.

SIM&TEC Simulation and Technology · *Analyst*   November 2014 – January 2016
Buenos Aires, Argentina

Member of the Satellites structural analysis group, in charge of the analysis and verification of computational models and design of prototypes.

- Performed structural analysis of satellites and dynamic verification of payload employing numerical analysis (NASTRAN).

Taylor Engineering Inc. · *Junior Engineer*   July 2013 – October 2014
Buenos Aires, Argentina

Trained in port engineering structural analysis.

- Performed a 50-year-old grain port structural and operational rehabilitation.

ACADEMIC EXPERIENCE

MIT Department of Civil and Environmental Engineering · *Teaching Assistant*　　Fall 2021, Fall 2023
Cambridge, MA

TA in 1.303 Infrastructure Design for Climate Change, undergraduate and graduate class led by Prof. Herbert Einstein.

- Supervised term projects of students.

The Catholic University of Argentina · *Teaching Assistant*　　October 2014 – July 2016
Buenos Aires, Argentina

TA in Stability II (Strength of Materials – Senior level), and Structural Mechanics (Senior level).

- Conducted Recitations and Office Hours.
- Supervised students' senior final projects.

LEADERSHIP EXPERIENCE

MIT CEE Communication Lab · *Communication Fellow*　　April 2020 – Present
Coach students and postdocs with their communication needs in essays, journal articles, figure design, grad school and scholarship applications, oral presentations, conference posters, etc.

MIT's NASA RASC-AL team · *Team member*　　September 2022 – June 2023
System design of a Mars Homesteading mission. [Winning team](#).

Ashdown House (MIT Graduate dorm)

　　Residential Scholar Coordinator (SPURS program)　　February 2022 – Present
　　Chair of Ashdown House Executive Committee (AHEC)　　May 2021 – May 2022

EDUCATION

Massachusetts Institute of Technology · *Ph.D. Candidate in Civil Engineering*　　Expected 2025
Cambridge, MA

MIT Sloan School of Management · *Business Analytics Certificate*　　2023
Cambridge, MA

MIT Riccio Graduate Engineering Leadership Program · *Graduate Certificate in Technical Leadership*　　2023
Cambridge, MA

Massachusetts Institute of Technology · *MSc. in Civil and Environmental Engineering*　　2018
Cambridge, MA

University of Buenos Aires · *Bachelor's in Civil Engineering*　　2013
Buenos Aires, Argentina

SELECT PUBLICATIONS

P1. "Experimental Study of Fluid Penetration and Opening Geometry during Hydraulic Fracturing". **Arzuaga, I.M**; Einstein, H. H. **Engineering Fracture Mechanics** (230), 2020.

P2. "Managing up: how to communicate effectively with your Ph.D. adviser". Saló-Salgado, L.; Acocella, A.; **Arzuaga García, I.**; El Mousadik, S.; Zvinavashe, A. **Nature**. 2022.

P3. "Evaluation of hydrologic and hydraulic response to anthropogenic alterations of Luján River's lower sub-basin, LaTunas' stream, in the Pampa Ondulada of Buenos Aires". **Arzuaga, I.**; Navarro, G.; Viñes, S.V. **Water Utility Journal** 19: 71-77. 2018.

P4. "Direct Shear Tests on Opalinus Clayshale for Natural Fracture Characterization". **Arzuaga, I.**; Einstein, H. H.; Germaine, J. Presentation at the 55th US Rock Mechanics/Geomechanics Symposium. 2021.