# Gabriel San Martín Silva

Mechanical Engineer, M.Sc.

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Santiago, Chile

I am a mechanical engineer with a master's degree under the supervision of Ph. D. Enrique López Droguett, researching the application of variational inference, deep learning and physical models for the prediction of remaining useful life and failure modes in systems and machinery using heterogeneous data such as multivariate time series or images. I have a strong interest in applied and theoretical research in the juxtaposition of deep learning with reliability in order to make modern industry safer and more cost efficient. The aforementioned interest have results in the publication of two papers as first author and one paper as the co-author in both international conferences and journals.

## EDUCATION

**UNIVERSITY OF CHILE** Santiago, Chile
*B.Eng. Mechanical Engineering* *2012 – 2018*

- Awarded as an "excellence student" every year from 2012 to 2018 by the faculty.

*MSc. Mechanical Engineering* *2018 – 2020*

- Fully financed by the Chilean government through a national scholarship for postgraduate studies.

## RESEARCH EXPERIENCE

**UNIVERSITY OF CHILE - SRMI LAB.** Santiago, Chile
*Undergraduate and Postgraduate student* 2017 – Present

- I have worked under the supervision of Ph. D. Enrique López Droguett in the Smart Reliability and Maintenance Integration (SRMI) Laboratory of the University of Chile, merging deep learning models, variational inference and physical models for industrial applications such as image recognition of cracks in structures, remaining useful life prognosis and failure modes diagnosis in industrial machinery and systems and the characterization of fatigue behavior in steel plates XFEM simulations.

## TEACHING EXPERIENCE

**UNIVERSITY OF CHILE – DEPARMENT OF MECHANICAL ENGINEERING.** Santiago, Chile
*Teacher Assistant in the "Big Data Analytics in Maintenance and Reliability" diploma.* 2019

- My functions in this diploma course include holding office hours, tutoring the students in their course projects and preparing and teaching workshops about the use of modern deep learning in modern reliability applications.

*Teacher Assistant in the undergraduate course "Deep Learning for diagnosis and prognosis"* 2019

- In this course I teach a weekly workshop in which the students solved problems concerning that week subject. I also was in charge of preparing the monthly homework assignment and scoring it.

*Teacher Assistant in various undergraduate courses* 2014-2019

- These courses include subjects as *solid's mechanics, energy production machines*, *computer science for engineering* and *cinematic and dynamic of mechanisms*, among others. In all these courses, my functions include preparing material for the class or exams, holding office hours and teaching practical classes, where we solved problems concerning the subjects to be evaluated.

## WORK EXPERIENCE

**UNIT, DATA SCIENCE/MACHINE LEARNING COMPANY IN CHILE.** Santiago, Chile
*Data Scientist* April 2020-Present

- Developing a 4-month project in the area of machine learning for a Chilean mining company.

**MARJOS, CONSTRUCTION COMPANY IN CHILE.** Santiago, Chile
*Engineering intern* 2017

- During this internship I oversaw the mechanical redesign of a telecommunication antenna.

**SAESA GROUP, ELECTRICAL COMPANY IN CHILE.** Santiago, Chile
*Engineering intern* 2016

- During this internship I developed a technical and economical evaluation of a clean energy generation project in the south of Chile.

## PUBLICATIONS

- P. Kobrich, **G.A. San Martín**, E. López Droguett, A. Ortiz Bernardin and Y. Zewdu Ayele. *Physics Based Deep Learning Model for Crack Propagation Prognostics*. Proceedings of the 29th European Safety and Reliability Conference (ESREL) 2019.
- **G.A. San Martín**, E. López Droguett, V. Meruane, M.C. Moura. *Deep variational auto-encoders: A promising tool for dimensionality reduction and ball bearing elements fault diagnosis*. Structural Health Monitoring Journal, 1475921718788299, 2018.
- **G.A. San Martín**, V. Meruane, E. López Droguett, M.C. Moura. *A deep variational auto-encoder based dimensionality reduction for fault diagnosis in ball bearings*. Proceedings of the 28th European Safety and Reliability Conference (ESREL) 2018.
- B. Eng. Thesis: Variational Auto-Encoder based model for the identification of failure modes in machinery (**G.A. San Martín** 2018). Under the supervision Ph. D. Enrique López Droguett.
- MSc. Thesis: Semi-Supervised Learning with Temporal Variational Auto-Encoders for the Diagnosis of Failure Severities and the Prognosis of Remaining Useful Life (**G.A. San Martín** 2020). Under the supervision of Ph. D. Enrique López Droguett.

## PROGRAMMING SKILLS

- Proficient programmer with languages Python and MATLAB.
- In Python, advanced knowledge of machine and deep learning libraries such as TensorFlow, Keras, PyTorch and Scikit-Learn.
- Strong knowledge of data science Python libraries such as Matplotlib, Scipy, Numpy and Pandas.
- Proficient with Unix O.S systems and Git version control.

## SCHOLARSHIPS

**CONICYT NATIONAL SCHOLARSHIP FOR MASTER STUDIES** Santiago, Chile
March 2018 – March 2020

- In 2018, I was awarded a full scholarship by the national commission of science and technology (Conicyt) to pursue a master's in science in mechanical engineering in the University of Chile. This scholarship is awarded annually to the top students on a national level.

## LANGUAGES

- Spanish: Native speaker

- English:  C1 Proficient User: IELTS 8.0

## OTHER ACTIVITIES

I am currently a member of the swimming club of the Faculty of Physics and Mathematical Sciences (FCFM in Spanish) of the University of Chile.

## REFEREES

- Ph. D. Enrique López Droguett: enlopez@uchile.cl
- Ph. D. Viviana Meruane Naranjo: vmeruane@uchile.cl