

## Cristovão Iglesias

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nationality

**Summary** I am a ML Engineer with a robust background in software engineering. My experience spans across various projects, from molecular dynamics simulations to digital twins development. Currently, I completed a Ph.D. in Computer Science (Machine Learning) at the University of Ottawa. I bring expertise in deep learning, Bayesian modeling, federated learning, NLP/LLM and data. My academic journey with over 10 years of experience in ML has equipped me with a strong foundation in developing ML systems for real-world applications.

## Skills

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- **Data Science & Machine Learning:** Deep Learning, Bayesian modeling, NLP, LLM, Data Fusion, Scientific machine learning, Nonlinear Kalman filters, Time-series analysis, uncertainty quantification and Federated learning
- **Programming & Development:** Python, SQL (PostgreSQL, MySQL), R, Julia, Ruby on Rails, Docker, AWS Stack, TensorFlow, PyTorch, JAVA, C++.
- **Communication & Teamwork:** Proven ability to work independently and collaboratively with technical and business teams. Effective in translating complex technical concepts into business language.
- **Problem Solving & Optimization:** Skilled in exploring and implementing innovative statistical approaches to optimize data pipelines and algorithms.
- **Continuous Learning:** Strong focus on continuous learning and staying updated with emerging technologies in analytics.

## Education

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- **Ph.D. in Computer Science (Machine Learning)**, University of Ottawa, Canada (2020/09 – 2024/09)
- **M.Sc. in Informatics**, Federal University of Rio de Janeiro, Brazil (2017/09 – 2019/10)
- **B.Sc. in Information Systems**, Estácio de Sá University, Brazil (2016/09 – 2019/11)
- **B.Sc. in Biophysics (Bioinformatics)**, Federal University of Rio de Janeiro, Brazil (2008/03 – 2013/03)

## **Professional Experience**

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**Machine Learning Researcher Assistant, University of Ottawa, Canada** (2020/02 – Present)

**Project 4** – A platform for automatic designing of resilient IoT applications from requirements documents.

- Utilized Python, Docker, Pytorch, Fine-tuning LLM, NLP, MySQL
- Responsible for design and implementation of the main platform's components.
- Publications reference: 8, 9, 14

**Project 3** - New Bayesian filtering approaches for fast and low-cost bioprocess monitoring with uncertainty quantification.

- Utilized Python, Julia, Docker, TensorFlow for advanced data modeling and analysis.
- Main responsible for design and develop the soft sensors with uncertainty quantification using a novel nonlinear Bayesian filtering approaches.
- Publications: 3, 6, 10, 11, 12, 13

**Project 2** - A Real-Time Respiration Monitoring and Classification System using a Depth Camera and Radars.

- Implemented machine learning models in Python and C++ for real-time monitoring and classification systems.
- Main responsible for design and implementation the real-time tasks.
- Publications: 5

**Project 1** - Monitoring elderly people in nursing homes.

- Project developed using python, cameras and movement sensors.
- Main responsible for implementation the system.

**Software Engineer, Clavis Segurança da Informação, Brazil** (2017/03 – 2019/04)

- Led the development of new functionalities for security products using bash scripting, AWS stack, Python and Ruby on Rails, and SQL.
- Enhanced data processing and analysis capabilities, contributing to project optimization.

**Software Engineering (Internship), EMC2, Brazil** (09/2014 - 03/2015)

- Development of plugins for Redmine using Ruby on Rails and PostgreSQL.

## **Software Engineering (Internship), NICTA, Australia (12/2012 - 03/2013)**

- Development of a visualization and analysis tool for the web in the GWAS area, to work with genomic data. Project developed using JavaScript, Python, D3.js. Available in: [link1](#) and [link2](#).

## **Bioinformatics Researcher (Internship), Ecole Normale Supérieure de Cachan, Laboratoire de Biotechnologie et Pharmacologie Génétique Appliquée, France (01/2011- 02/2011)**

- Study the initial steps of activation of BAX by BIM (BH3) through normal modes analysis of the vibration (NMA), optimizations techniques, Python and analyze the modes consensus.

## **Bioinformatics Researcher (Internship), Health Sciences Center, Federal University of Rio de Janeiro - Brazil, Modeling and Molecular Dynamics Laboratory – Brazil, (03/2009 - 01/2011)**

- Molecular Dynamics Simulation for drug design. Project developed using C/C++, Python, R, optimizations techniques, PCA, Cluster analysis and Data Mining techniques.

## **Idioms** \_\_\_\_\_

English, Portuguese and Spanish

## **Awards & Honors** \_\_\_\_\_

- Best Work of the Section, XXXV Giulio Massarani Journey of Scientific Initiation, UFRJ (2013)
- Honorable Mention, Health Sciences Center, XXXII Giulio Massarani Journey of Scientific Initiation, UFRJ (2010)

## **Publications ([link](#))** \_\_\_\_\_

1. A domain model for personalized monitoring system based on context-aware data fusion (**FUSION** 2019).  
Skill: Software Engineering, data fusion
2. Handling Massive Proportion of Missing Labels in Multivariate Long-Term Time Series Forecasting (**IC-MSQUARE** 2021).  
Code: <https://github.com/CARG-uOttawa/handlingMPML/tree/main>  
Skills: Python, TensorFlow, LSTM, Deep Learning

3. Monitoring the Recombinant Adeno-Associated Virus Production using Extended Kalman Filter (**Processes** Journal - 2022).  
Code: <https://github.com/CARG-uOttawa/EKF4AAVproduction>  
Skills : Julia, Bayesian Inference for optimization, EKF, NODE
4. Agile software development learning through open hardware project (**WBMA** - 2015).  
Skill: Software Engineering
5. A real-time respiration monitoring and classification system using a depth camera and radars (**Frontiers** – 2022).
  - a. Skills: Python, Classification, data fusion.
6. rAAV Manufacturing: The Challenges of Soft Sensing during Upstream Processing (**Bioengineering Journal**– 2023).
7. DEMDE: Decision Making Design based on Bayesian Network for Personalized Monitoring System (**FUSION** - 2023).  
Code: <https://github.com/cristovaoiglesias/demde>  
Skills : Bayesian network
8. An Architectural Design Decision Model for Resilient IoT Application. arXiv preprint (**arXiv** – 2023).  
Skill: Software Engineering
9. Automated Extraction of IoT Critical Objects from IoT Storylines, Requirements and User Stories via NLP (**SDS** - 2023).  
Code:  
[https://github.com/cristovaoiglesias/iot\\_critical\\_obj\\_extraction\\_via\\_nlp](https://github.com/cristovaoiglesias/iot_critical_obj_extraction_via_nlp)  
Skills : NLP, Python, Tensorflow, Pytorch, BERT, Transformers, EIMo
10. How Not to Make the Joint Extended Kalman Filter Fail with Unstructured Mechanistic Models (**Sensors** Journal – 2024).  
Code: <https://github.com/cristovaoiglesias/JEKF-SANTO>  
Skills : Julia, Optimization, Bayesian Inference
11. Hybrid Nonlinear Kalman Estimators for Low-Cost Bioprocess Monitoring (Submitted for **EAAI** 2024)  
Code: <https://github.com/cristovaoiglesias/HNKE>  
Skills : Julia, Optimization, Bayesian Inference, Filters, Deep Learning
12. Batch Bayesian Auto-Tuning for Nonlinear Kalman Estimators (Submitted for **Nature Scientific Report** 2024)  
Code: <https://github.com/cristovaoiglesias/BAT>  
Skills : Julia, Global optimization, Genetic Algorithm, Bayesian

## Optimization, Bayesian Inference

13. Limitations of Joint and Dual Nonlinear Kalman Estimators in Low-Cost Bioprocess Monitoring (LatinX- **ICML** 2024)  
Code: <https://github.com/cristovaoiglesias/NKEs-SANTO>  
Skills: Julia, Global optimization, Nonlinear Kalman Estimators, Bayesian Inference
14. Pessoa, Luis, Iglesias Jr, Cristovão, et al. “*RITA: Automatic Framework for Designing of Resilient IoT Applications*”. **LaFUSION** 2024.  
Code: <https://github.com/LEpessoa/RITA>  
Skills: Python, LLM, NLP  
Video: <https://www.youtube.com/watch?v=A-FVh4axTW0>
15. Two Students: Enabling Uncertainty Quantification in Federated Learning Clients. (BDU – **NeurIPS** 2024).  
Code: <https://github.com/cristovaoiglesias/2S>  
Skills: Python, Julia, federated learning