Renato Giorgiani do Nascimento

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SUMMARY

I'm a Ph.D. Candidate and Research Assistant at the Probabilistic Mechanics Laboratory at the University of Central Florida (UCF). My current research, in collaboration with the Diagnostics and Prognostics group at NASA Ames, concentrates on the aging of Lithium-ion batteries with probabilistic hybrid machine learning. With over 15 years of research and development experience in software for consumer and industrial applications, before starting my Ph.D. studies, I've helped to deploy large scale Industrial AI solutions. After completing my Ph.D., I look forward to joining an organization that values leadership, performance, teamwork, and results.

EDUCATION

University of Central Florida — Orlando, FL, USA
PhD. in Mechanical Engineering — 2018 – May/2022
Research topic: Physics-informed machine learning for electric powertrain modeling and prognosis

M.Sc. in Aerospace Engineering — 2018 – 2020
Thesis: Hybrid physics-informed neural networks for dynamical systems

UNESP – Universidade Estadual Paulista — Rio Claro, SP, Brazil
B.Sc. in Computer Science — 2009 – 2014

- Graduated as 3rd best overall
- Undergraduate Research: Three-Dimensional Modeling of Respiratory Bronchioles and Augmented Reality Visualization
- Worked in the Project WorldPedia: HTML5 Mobile App, based on Artificial Intelligence and Web Semantic (RDF) that query on Wikipedia using GEO references position from the device.

Salem State University — Salem, MA, USA
Computer Science (Exchange Student) — Aug/2013 – Aug/2014

- 2nd place award - Programming Contest in Mathematics - SSU – May/2014
- Represented SSU team at the CCSC-NE 2014 Programming Contest
- Worked with the Computer Science Department to develop the university map app.

WORK EXPERIENCE

University of Central Florida — Orlando, FL
Graduate Research Assistant @ the Probabilistic Mechanics Laboratory — Aug/2018 – present
Develop and implement algorithms for physics-informed neural networks with emphasis on drone control and reliability estimation of industrial equipment. Develop and implement algorithms for large scale machine learning training and inference.
KEY PROJECTS:

- Physics-informed neural networks for cumulative damage modeling applied in fatigue estimation of aircraft fuselage panels.

- Reverse engineering quadrotor drone dynamics with physics-informed neural networks.

Amazon Cupertino, CA
Solutions Architect I Inter @ AWS May/2021 – Aug/2021
Developed deep learning solutions for the Neuron SDK and AWS Inferentia.

NASA Ames Research Center Moffett Field, CA
Intern with KBR @ NASA Diagnostics & Prognostics Laboratory May/2020 – Aug/2020
Diagnostics and prognostics modeling of drone powertrain systems with physics-informed machine learning.

Renato Giorgiani Software ME Americana, SP, Brazil
Chief consultant and Owner Jan/2015 – Aug/2018
Performed software design, research, and development for GE Global Research (Niskayuna, NY) and BHGE Digital (San Ramon, CA).
KEY PROJECTS:

- AI Framework to build and visualize multiple analytics models and techniques in large scale deployed to cloud services. Demos presented in Google Next (2018, 2019) and Microsoft Azure AI 2019 with interactive cluster visualization.
- Probabilistic cumulative damage model for aircraft engines application: real-time processing and visualization of execution data (simulated engine operation) in a Raspberry PI board.
- Big data visualization tools: unique and customs web visualization tools using the advanced components and visualization (e.g., d3.js and Plot.ly).
- User-defined model application: NodeJs embed web application (self-runnable app) to run custom R and Python scripts with data loading and visualization over the web browser.
- Platform frontend remodeling and development. Convert plain javascript code to structured AngularJs application, creating reusable components. NodeJs embed web application, including session management and security layers, and optimal build and deployment scripts.

GE Global Research Niskayuna, NY, USA
R&D Intern @ the Probabilistics Design Laboratory May/2014 – Aug/2014
Supported key research and development activities for Usage Based Lifing project.
KEY PROJECTS:

- Big data visualization tools: development of an "in-browser" data analytics and visualization application. Parallel data analysis with web workers and fast and optimal visualization charts to process and visualize big data files directly on the browser.
- HTLM5/JavaScript advanced Information Visualization tools

Araras City Hall Araras, SP, Brazil
Computerized Media Director Jan/2009 – Jul/2013
Managed the information technology and computer systems using rigorous project management, system integrations, software design, architecture, and development.
KEY PROJECTS:

- Design and develop the official Araras City Hall website www.araras.sp.gov.br. Integration with

considerable different city hall services and systems. Comport heavy traffic access from city population and employees (over 3,000). Management of the local web server (IIS).

- Design, architect and feasibility study the implantation of new management software for the Department of Education.
- Design and development of applications, as requested by the city hall administration (Newsletter email system, Photo gallery and management system, City Hall public data reports system, etc.).
- Also responsible for coordinating the design of all graphics needed to all correlated systems.

ValeInvest Marcos Domingues Ltda Araras, SP, Brazil
Web Developer Jan/2008 – Dec/2009
Software design and develop of intranet system, for a network of a financial business company.
KEY PROJECTS:

- Web ERP System. Software made to control clients, employees, and business data and provide insights with smart data visualization. Frontend developed in JavaScript and HTML and Backend developed and Visual Basic (ASP) with Access DB. Enhanced security access with Biometrics sensor. System integration with Federal Government services.

Evidência Marketing e Pesquisas Ltda Pirassununga, SP, Brazil
Web Developer Jan/2007 – Dec/2007
Consultant and software developer to marketing and survey company. Design and develop of survey system application involving data analysis and information visualization smart reports.
KEY PROJECTS:

- Design and development of Pirassununga City Hall Official Website www.pirassununga.sp.gov.br, to receive heavy traffic access and connect with the other city hall services systems.
- Design and development of a website to create, edit and visualize surveys campaigns. Rich web visualization, pioneer at the time, with Flash charts, interactivity and dynamic data loading.
- Also responsible for coordinating the design of all graphics needed to all correlated systems.

Casa das Palavras Publicações Araras, SP, Brazil
Web Designer Jan/2004 – Dec/2006
Web design and development of news Website. Software design and development of intranet system to manage newspaper pictures and stories. Design of graphic projects.
KEY PROJECTS:

- Interactive photo essays app. A system for managing pictures from photo essays and create interactive presentations in Macromedia Flash. (ASP.Net, Access Database, ActionScript)
- Newspaper website system for managing news and pictures, with newspaper digital version.

PATENTS

(5) A. K. Subramaniyan, A. N. Iankoulski, S. Sivaramakrishnan, **R. G. do Nascimento**, and F. N. de Paula, Autonomous Hybrid Analytics Modeling Platform, US Patent App. 16/258,489, 2019.
(4) A. K. Subramaniyan, A. N. Iankoulski, **R. G. do Nascimento**, Integrated development environment for analytic authoring, US Patent 10,296,296, 2019.
(3) A. K. Subramaniyan, A. N. Iankoulski, **R. G. do Nascimento**, Systems and methods for optimizing graphics processing for rapid large data visualization, US Patent 9,978,114, 2018.
(2) A. K. Subramaniyan, J. Lazos, N. C. Kumar, A. N. Iankoulski, and **R. G. do Nascimento**, System architecture for secure and rapid development, deployment and management of analytics and software systems, US Patent App. 15/338,839, 2018.
(1) A. K. Subramaniyan, A. N. Iankoulski, **R. G. do Nascimento** , Self-aware and self-registering software & analytics platform components, US Patent App. 15/338,886, 2018.

PUBLICATIONS

(10) **R. G. Nascimento**, F. Viana, M. Corbetta and C. S. Kulkarni, “Hybrid Physics-Informed Neural Networks for Lithium-Ion Battery Modeling and Prognosis,” Journal of Power Sources, Volume 513, 2021, 230526, ISSN 0378-7753, https://doi.org/10.1016/j.jpowsour.2021.230526.
(9) **R. G. Nascimento**, F. Viana, M. Corbetta and C. S. Kulkarni, “Usage-based Lifing of Lithium-Ion Battery with Hybrid Physics-Informed Neural Networks,” AIAA 2021-3046. AIAA AVIATION 2021 FORUM. August 2021.
(8) F. A. C. Viana, **R. G. Nascimento**, A. Dourado, Y. Yucesan , “Estimating model inadequacy in ordinary differential equations with physics-informed neural networks,” Computers and Structures, Vol. 245, 106458, 2021. (DOI: 10.1016/j.compstruc.2020.106458).
(7) **R. G. Nascimento** and F.A.C. Viana, “Cumulative damage modeling with recurrent neural networks,” AIAA Journal, Online First, 13 pages, 2020. (DOI: 10.2514/1.J059250).
(6) **R. G. Nascimento**, K. Fricke, and F. A. C. Viana, “A tutorial on solving ordinary differential equations using Python and hybrid physics-informed neural network,” Engineering Applications of Artificial Intelligence, Vol. 96, 2020, 103996. (DOI: 10.1016/j.engappai.2020.103996)
(5) K. Fricke, **R. G. Nascimento**, and F. A. C. Viana, “Quadcopter Soft Vertical Landing Control with Hybrid Physics-informed Machine Learning,” AIAA 2021-1018. AIAA Scitech 2021 Forum. January 2021.
(4) A. V. Zuben, **R. G. Nascimento**, and F. A. C. Viana, “Visualizing corrosion in automobiles using generative adversarial networks,” Proceedings of the Annual Conference of the PHM Society, Vol. 12, Virtual Event, November 9-13, 2020 (DOI: 10.36001/phmconf.2020.v12i1.1148)
(3) **R. G. Nascimento**, K. Fricke, and F. A. C. Viana, "Quadcopter control optimization through machine learning," AIAA SciTech Forum, Orlando, USA, January 6-10, 2020, AIAA 2020-1148 (DOI: 10.2514/6.2020-1148).
(2) **R.G. Nascimento** and F.A.C. Viana, “Satellite Image Classification and Segmentation with Transfer Learning,” AIAA SciTech Forum, Orlando, USA, 2020, AIAA 2020-1864 (DOI: 10.2514/6.2020-1864).
(1) **R.G. Nascimento** and F.A.C. Viana, “Fleet prognosis with physics-informed recurrent neural networks,” The 12th International Workshop on Structural Health Monitoring, Stanford, USA, 2019.

HONORS & AWARDS

- 2018-2019 UCF Office of Research & Commercialization Fellowship
- GE Global Research - Above & Beyond - Bronze Award – Jul/2014
- Undergraduate Research selected and presented at the XXIII Conference of Scientific Initiation of UNESP - CIC / UNESP, Brazil – Aug/2011