Marco A. Rueda

Sr. Computer Vision/Deep Learning Research Engineer
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PERSONAL STATEMENT

Senior Research Engineer and Consultant with 6+ years of experience in Machine Intelligence and Computer Vision applied to real-world problems in Robotics for Smart Industries, Embedded Systems, Aerial and Satellite Imaging, Oil & Gas sector, Biomedical, Intelligent Transportation Systems, Cloud-based Serverless Microservices, and Security Systems. I hold an MSc in Computer Science and an MSc in Project Management and extensive experience in designing and materializing projects related to Artificial Intelligence, adapting or proposing cutting-edge technologies for companies such as Bosch, Altran Group, Smart, HP, Petrobras, Volkswagen, Vale mining, and the Colombian Petroleum Company; either for research purposes or translating research works into commercial products for Industry 4.0.

ADVISORY & CONSULTING - PROJECTS

- **NSSCO:** Co-founder of the National Space Society Colombia (website)
- **Trust in Space**: A blockchain-based community and round table for space navigation. This project aims to enable private data sharing between Space Operators, Space-Based Earth Services, Earth Observation systems and more, all at the same time.
- **QSentinel**: Video Management System based on AWS microservices.
- **GeNFTs**: Collection of *Non-Fungible Genetic Tokens* (Images + Music + Fables) translated from DNA proteins of endangered species.

EMPLOYMENT HISTORY

Oct/2021 – Currently

Senior Research Engineer in Computer Vision (R&D position) | Bosch Security Systems, Ovar, Portugal

- Find the most suitable state-of-the-art solutions, create data acquisition methods, and implement and design computer vision systems to improve production by solving factory-related problems
- Design and implement computer vision modules for multi-domain and multi-modal 3D and 2D systems.
- Create the foundation of a new powerful artificial vision AIoT platform for industrial applications working in a Scrum environment.
- Responsible for work packages and support to other team members.

Jan/2020 – Oct/2021

Advanced Research Engineer in Computer Vision (R&D position) | VORTEX-CoLab, Porto, Portugal

- Apply SOTA edge Deep Learning techniques of scene understanding for the perception module of the Argus project (dataset annotation web tool for autonomous vehicle projects). This involves training state-of-the-art methods for object detection and panoptic segmentation.
- Create datasets from scratch for object detection of street and traffic signs; and instance/semantic/panoptic segmentation of European autonomous vehicles environments.
- Build ROS submodules for automatic labeling, LOAM, 3D cluster segmentation, fish-eye image segmentation, and 3D Box estimation.
- Propose a new method to accelerate the interactive image segmentation task for multiple labels by using dynamic programming and image partitioning to find the minimum cut in a graph.
- Perform object detection and image classification, using TensorFlow Lite and classical machine learning techniques on embedded systems + Google Coral USB.
- Anonymize datasets by using SOTA detection and classification ML/DL techniques to satisfy the GDPR and CNPD restrictions of the European Union.

Sep/2019 – Dez/2019

Computer Vision Researcher (R&D position) | INESC TEC, Porto, Portugal

- Design and Develop a Face detection and Recognition app that works in real-time on CPU. The software does open-set facial recognition and performs gender, age, and emotion estimation. This app handles seven different state-of-the-art methods to run on CPU and compares them in terms of latency and accuracy. This AI & ML system is implemented in Python, PyQT and MySQL.

Jun/2018 – Jun/2019 & Remote: Sep/2019 - Jan/2020

Consultant in Computer Vision (R&D position) | Brazilian Institute of Robotics - CIMATEC, Salvador, Brazil

- **"*Geonosis project - Vale Institute of Technology*"**: Conducted data processing from sensors as LiDAR, RGB cameras, and Hyperspectral cameras, using computer vision techniques for minerals qualification in open-pit mines.
- **"Kamino *project - Vale Institute of Technology*"**: An intelligent vehicle system to assist drivers in low visibility conditions in open pit mines. Proposed new LiDARs and monocular cameras calibration methods, processed RGB-D images, and re-implemented a well-known CNN architecture for real-time semantic segmentation and object detection, working on ADAS sensors.
- **"*Intelligent measurement of concrete volume - Votorantim S.A.*"**: The volume of concrete coming out of a truck discharging chute was estimated very accurately. For this, RGB-D frame sequences were processed to estimate the area per pixel and fluid velocity using only computer vision techniques, including Particle Image Velocimetry. This embedded system estimated the concrete flow volume with very low CPU latency.
- **"*Samsung batteries qualification* - Smart company"**: This Deep Learning system automatically assess a set of batteries by processing 5K RGB images. It exploits instance segmentation, anomaly estimation and a regression subnet for accurate estimating the actual real size of each battery tab-cut without using camera calibration settings.
- **"Civil works *qualification*" - Gráfico Emprendimentos construction company"**: This mobile application evaluates the quality of civil works executions using BIM and Computer Vision. The software receives images from the camera of any device and generates an appraisal report of anomalies by running segmentation and anomaly detection.

Jul/2016 –Jul/2018

Student Researcher | IVision Lab - Federal University of Bahia, Salvador, Brazil

As a student, I worked on projects spanning the fields of Smart Cities, Intelligent Transportation Systems and Medical Image Processing.

- Supported in extending state-of-the-art object detectors for the task of Rotated bounding-box estimation. We proposed two CNN architectures (RBoxNet and RboxDNet) for rotation invariant object detection on forward-looking sonar images in underwater applications.
- Built a new version of the GET-IN project (Intelligent Traffic Manager), using deep learning techniques for detecting and segmenting objects.
- Supported building and deploying a teeth detector system using instance segmentation from panoramic X-ray images.
- Built a tool for semi-automatically building multi-purpose and multi-pose synthetic datasets from 3D models.

Jan/2012 – Dec/2015

Project planner and controller - Oil & Gas | CMK/PB LTDA/GIP SAS, Barrancabermeja, Colombia

- Perform the design, planning, and control of engineering and consulting projects.
- Lead teams to carry out tasks efficiently and effectively.
- Developed informatics systems using JAVA programming language.

Apr/2011 – Dec/2011

Systems engineer | Industrial University of Santander, Bucaramanga, Colombia

- Design and develop the SGPUIS; a system to manage projects based on the PMBok. JAVA EE, C++.

EDUCATION

Jul/2016 – Jul/2018
MSc: Computer Science (Computer Vision and Machine Intelligence)
Universidade Federal da Bahia | Salvador, Brazil
Advisor: Professor Dr. Luciano Oliveira - Link
Thesis Title: A tool for building multi-purpose and multi-pose synthetic 3D data sets.
GPA: 9.46/10.0

Apr/2015 – Apr/2017
MSc: Design, Operation and Project Management
International Iberoamerican University | Arecibo, Puerto Rico (USA)
Universidad Europea del Atlántico | Cantabria, Spain
Thesis Title: Analysis of the current state of competitiveness of companies in the digital photographic sector in Barrancabermeja, Colombia.
GPA: 8.44/10.0

Jul/2004 – Mar/2011
BSc: Systems Engineering
Universidad Industrial de Santander | Bucaramanga, Colombia
GPA: 3.93/5.0

ADDITIONAL SKILLS

- **Programming languages:** OpenCV, ML libraries, ROS, Keras, TensorFlow, PyTorch, Amazon Web Services AWS, Git, Linux.
- **Teamwork:** twice awarded for teamwork in a project of high economic and social impact for the petroleum company of Colombia.
- **Management and Administration:** experience and project management skills, self-motivated, creative, and hardworking. Experience with Scrum. Remote work experience.
  CTO of UbiHPC company for a two years contract.
- **Languages:** Spanish, Portuguese, English.

PUBLICATIONS

- Low-latency Perception in Off-Road Dynamical Environments of Low Visibility. In: Expert Systems with Applications, 2022, Nelson Alves, **Marco Ruiz**, Marco Reis, et al. H-Index: 225 (Q1).
- Software registration of quality control system for construction execution using BIM models. In: Instituto Nacional de Propriedade Industrial (NPI), Brazil, 2020, Dos Santos Liordino, Neto Rosalvo, Barros João, **Ruiz Marco**, et al.
- Faster alpha-expansion via dynamic programming and image partitioning. In: IEEE International Joint Conference on Neural Networks (IJCNN), London, 2020, Fontinele Jefferson, Mendonça Marcelo, **Ruiz Marco**, et al. H-Index: 82 (Rank: A)
- A tool for building multi-purpose and multi-pose synthetic data sets. In: VII ECCOMAS Thematic Conference on Computational Vision and Medical Image Processing (VipIMAGE 2019), Porto, 2019, **Ruiz Marco**, Fontinele Jefferson, Perrone Ricardo, et al. H-Index: 16 (Q4).
- Rotated multi-object detection with forward-looking sonar in underwater applications. In: Expert Systems with Applications, 2019, Neves Gustavo, **Ruiz Marco**, Fontinele Jefferson, Oliveira Luciano. H-Index 225 (Q1).
- Deep instance segmentation of teeth in panoramic X-ray images. In: IEEE Conference on Graphics, Patterns and Images (SIBGRAPI'2018), Foz do Iguaçu, 2018, Jader Gil, Fontinele Jefferson, **Ruiz Marco**, et al. H-Index: 22.