Marco A. Ruiz Rueda

Computer Vision/Deep Learning Research Engineer

Address: Porto, Portugal

Email: marcoruizrueda@gmail.com | Telephone/WhatsApp: +351 938 460 930

Google scholar: https://scholar.google.com/citations?user=yOF216YAAAAJ

LinkedIn: https://www.linkedin.com/in/marco-a-ruiz-b73919117/

PERSONAL STATEMENT

Senior Research Engineer and Consultant with 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 a MSc in Computer Science and a 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 Industries 4.0.

ADVISORING & CONSULTING - PROJECTS

- **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.
- **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.

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, 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 RGPD and CNPD restrictions of the European Union.

Sep/2019 – Dez/2019

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

- Developed 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. Seven different state-of-the-art methods were implemented to run on CPU and compared in terms of latency and accuracy.

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 support drivers in conditions of low visibility 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.*"**: We used image processing techniques on RGB-D frame sequences and applied Particle Image Velocimetry and pixel-wise area estimation to compute the volume of the concrete flow, only using computer vision techniques.
- **"*Samsung batteries qualification* - Smart company"**: A Deep Learning system for batteries qualification from 5K RGB images, which exploits instance segmentation, including anomaly estimation and a regression sub-network for accurate estimation of the real size of batteries and their parts, without using the camera calibration settings.
- **"Civil works *qualification*" - Gráfico Emprendimentos construction company"**: A system to evaluate the quality of civil works executions using BIM and Computer Vision. This mobile application receives images from the camera of any device and generates an appraisal report of anomalies.

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 in building a teeth segmentator 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)

Federal University of 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

Iberoamerican International University | Arecibo, Puerto Rico.

European University of the Atlantic | 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

Industrial University of Santander | Bucaramanga, Colombia.

GPA: 3.93/5.0

ADDITIONAL SKILLS

- **Programming languages:** Python, OpenCV, ML libraries, C++, ROS, JAVA, Keras, TensorFlow, PyTorch, Amazon Web Services AWS.
- **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. Remote work experience. CTO of UbiHPC company for a two years contract.
- **Languages:** Spanish, Portuguese, English.

PUBLICATIONS

- Real-time Sensors Fusion with Automatic Odometry and Mapping for Scene Understanding Application. In: Journal Robotics and Computer Integrated Manufacturing, 2022 (In progress).
- Low-latency Perception in Off-Road Dynamical Environments of Low Visibility. In: International Journal on Expert Systems with Applications, 2022.
- Software registration of quality control system for construction execution using BIM models. In: Instituto Nacional de Propriedade Industrial (NPI), Brazil, 2020.
- Faster alpha-expansion via dynamic programming and image partitioning. In: International Joint Conference on Neural Networks (IJCNN), London, 2020.
- 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.
- Rotated multi-object detection with forward-looking sonar in underwater applications. In: International Journal on Expert Systems with Applications, 2019.
- Deep instance segmentation of teeth in panoramic X-ray images. In: Conference on Graphics, Patterns and Images (SIBGRAPI'2018), Foz do Iguaçu, 2018.