Roi Santos Mateos *March 15th, 2020*

roi.santos@usc.es • roi.santos.mateos@gmail.com • +34 698137694 • Publications in USC.es • LinkedIn

Laboratory P1, CITIUS, USC • Campus Vida, 15782 • Santiago de Compostela • Spain

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Research Summary

Licentiate in Physics and PhD in Computer Science in 2019. I have recently published papers about Computer Vision methods in Q1 journals.

Since 2014 I am affiliated with the Department of Electronics and Computer Science (USC), where I pursued my PhD in Computer Vision for the subsequent 5 years. During my PhD I have broaden my knowledge about **designing and implementing algorithms for Computer Vision and signal processing**. I went through the scientific process of building my test cases in order to validate the algorithms. I also built backends to retrieve results and compare them with other models in the state of the art. Finally, I built frontends and GUI's to present these results, draw figures and publish my work.

During the last year I have been working in the design, implementation and certification of aeronautical Computer Vision aimed military-grade systems, sensors and communication infrastructures, applied to onboard and cloud systems. Moreover, I kept broadening my knowledge in Data Science.

I am fluent in **English, Spanish, Galician and Portuguese**.

Most relevant experience

Babcock MCSFM SA
ALICANTE, SPAIN

R&D Product Engineer. *Current position, since Jan '19*

Development of Computer Vision and communication applications, design of **gimbal**-based onboard surveillance systems for firefighting and SAR mission aircrafts. Development of software for the control and configuration of onboard gimbal-mounted camera systems (visible, IR, multispectral). Aerial image orthorectification techniques. Detection of shapes. Photogrammetry. Projection onto 3D terrain. I set the requirements and assessment for onboard and cloud systems for surveillance in the largest fleet of helicopters for Emergency Services in Spain, including firefighting and sea-rescue. Working with **military-grade sensing systems** and **coordinating research groups** in different universities keeps me updated in the state of the art. **Equipment**: Trakka gimbals, with InfraTec and FLIR thermographic cameras, Sony visible cameras, Microstrain navigation solutions (inertial sensors), GPS, Iridium-based modem devices, SVP Broadcast Microwave H265 Aerial Video Transmission, Centum AIS and Lifeseeker. Work under ISO 9001 based standards.

Electronics and Computation Dpt., University of Santiago de Compostela

PhD candidate researcher in Computer Vision *Jan '14 - Jun'19*

I succeeded publishing the required papers in Q1-ranked journals and presented my work in international congresses. I **defended and published my PhD thesis in 2019**, awarded with **Cum Laude**. Refer to the details in in the *Publications* section of this CV.

I designed, implemented and analyzed my own methods and algorithms. I validated my contributions from experiments performed using my own code, which I developed myself in C++ and Python for Linux/Windows/Mac to work in real-time with Parrot drones. My software performs feature extraction in images, real-time processing of streamed video from the vehicle, and finally 3D environment abstraction using points, lines and targets. I registered my software through the USC transfer office.

Side hustle: Teaching to students Raspberry Pi, Arduino and sensors *Jan '14 - Jan'19*

My side hustle during my PhD years was closely related with the research and experimental work I was doing in the University. Doing technical support in laboratories got me familiar with rapid prototyping. I have also taught programming for Raspberry Pi with OpenCV and sensors. I have also taught students how to pilot different kinds of fixed wing aircraft and multicopters equipped with ArduPilot, same as I was doing for the experimental part of my research work.

S4SD - Software 4 Science Developments
SANTIAGO DE COMPOSTELA, SPAIN

Research in molecular interactions. *Jan '15 – Sep '15*

Implementation of algorithms in C++ for the Backend of Affinimeter (www.affinimeter.com), a cloud service for Isothermal Titration Calorimetry. **Design and implementation** of Levenberg-Marquardt based least-squares optimization and Simulated Annealing for molecular binding models.

Von Karman Institute for Fluid Dynamics
BRUSSELS, BELGIUM

Research in Aerospace *Sep '12 – Sep '13*

I designed and implemented **CFD solvers for OpenFOAM**. I experimentally worked with data acquisition and processing, signal analysis and measurement techniques in aerospace. I built my own 3D meshes and performed simulations of turbulence with comparison against experimental measurements.

Department of Astrophysics, University of Vienna	Vienna, Austria
Internship	*Jun '12 – Jul '12*

In this short internship I learnt to use CASA, and got my first accomplishments in image processing. We submitted an application for ALMA.

Indra	Badajoz, Spain
Junior Software Engineer and Q & A	*Jan '12 – Jun '12*

Development of drivers for Movistar USB modem devices, using **Python**. By implementing for these harware devices in Ubuntu/Fedora/OpenSUSE, I learnt how Linux kernels get access to external hardware controllers through the USB port.

New University of Lisbon (NMT Tecnologia)	Lisbon, Portugal
Internship	*Jan '11 – Jun '11*

I teamed with Electrical Engineering department from New University of Lisbon for the development of drivers for medical fluxometers in **Python**. My software fetches and plots sensor readings about measurements of flow speeds through a separator and a gas CO_2 analyzer.

Most relevant education

University of Santiago de Compostela	Santiago de Compostela, Spain
PhD in Computer Science	*2019*

PhD granted "Cum Laude" by University of Santiago de Compostela and University of A Coruña.

Skills

Technical skills: Signal processing, image processing, electronics, sensors. Software design and implementation in C++, Python and Matlab for Windows, Linux and Mac. OpenMP and CUDA, Qt Framework. ROS, RabbitMQ RESTful API. Mathematical libraries: FFTW, BOOST, BLAS/LAPACK, OpenCV, CERES. LaTeX. High skilled pilot for fixed wing and multi-rotor drones.

Natural languages: Spanish *(mother tongue)*, Galician *(mother tongue)*, Portuguese and English *(full professional proficiency)*

Publications

"From line matching to 3D abstraction" - [Download PDF]	PhD thesis
University of Santiago de Compostela, 2019.	*2018*

My PhD thesis goes through straight segment detection on images, all the way through matching them between images, up to the automated creation of 3D representations from these detected primitives. My contributions have applicability in the detection of shapes in images, feature matching and Structure-From-Motion based on groups of images.

"Scene wireframes sketching for Unmanned Aerial Vehicles"	Q1 journal
Pattern Recognition, ELSEVIER SCI LTD , Vol. 86, pp. 354-367 , 2019.	*2018*

In this work I present a novel method for 3D abstraction of environment. I experimentally compared it against other state of the art method. It is aimed for real-time environment understanding by UAVs. Ranked Q1 in Computer Vision and Pattern Recognition by SJR. DOI 10.1016/j.patcog.2018.09.017

"Outlier detection for line matching"	Congress
The 23rd Iberoamerican Congress on Pattern Recognition, Madrid	*2018*

Novel outlier detection method teamed for the two-views line matching problem.

"Scene wireframes sketching for UAV"	IEEE workshop
2017 IEEE Applied Imagery Pattern Recognition Workshop. Washington DC (USA). 2017	*2017*

Application of SfM for UAV, presented in IEEE workshop. DOI 10.1109/AIPR.2017.8457938

"Adaptative Line Matching for Low-Textured Images"	International congress
7th Iberian Conference on Pattern Recognition and Image Analysis,	*2015*

Line matching method for pairs of images, aimed for urban scenes. DOI 10.1007/978-3-319-19390-8 22

"Two-view line matching algorithm based on context and appearance in low textured images"	
	Q1 journal
Pattern Recognition, ELSEVIER SCI LTD , Vol. 48, No. 7, pp. 2164-2184 , 2015.	*2015*

A novel approach for line detection and matching is proposed, aimed at achieving good performance with low-textured scenes, under uncontrolled illumination conditions. Ranked Q1 in Computer Vision and Pattern Recognition by SJR. DOI 10.1016/j.patcog.2018.09.017