Viorela Ila

Initials	Place of birth:	Cluj-Napoca, Romania
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Research Interests

My research lies at the intersection of two fields, robotics and computer vision. In my research, I am focused on delivering foundation methodologies and algorithms to enable robotic systems to build real-time detailed 3D representation of the environment, a problem known as simultaneous localization and mapping (SLAM). This problem is of key importance in enabling robotic systems to progress from the structured setups such as labs and factories to operating in real world environment. My research approach draws from recent advances in fundamental fields such as stochastic systems, information theory, high performance computing, machine learning and linear and nonlinear algebra and develops principled techniques and algorithms further integrated into robotic SLAM systems.

Position

Senior Lecturer (Level C) at The University of Sydney

Education

University of Girona, Girona, Spain

PhD in Information Technologies **November 2003 – November 2005**

- Research Topic: Reconfigurable Architecture for Motion Estimation in Underwater Imaging
- Advisors: Prof. Joan Batlle, Dr. Rafael Garcia

Advanced Studies Degree **October 2000 – November 2003**

- Research Topic: Reconfigurable Device Architecture for Robotic Applications
- Advisors: Prof. Joan Batlle

Technical University of Cluj-Napoca, Cluj-Napoca, Romania

BSc. in Computer Science and Automation **September 1995 – September 2000**

Grants and Awards

Best Paper Honorable Mention at 3D Vision conference in Quindao, China, 2017.

First prize "Student Poster Competition" at OCEANS conference in Aberdeen, UK, 2017, presenting student Klement Istenic (UdG).

Honorable Mention Best Presentation at Robotics Science and Systems (RSS) conference in Berlin, Germany, 2013, presenting student Lukas Polok (BUT).

OSEO First prize. Concours national d'aide à la création d'entreprises innovantes competition with a financial support of 40,000 Euros for *suBmarine Open Technology* start-up, France, 2013.

MICINN /FULBRIGHT mobility grant - Georgia Tech, Atlanta USA, 2009-2010.

CSIC mobility grant - ACFR, University of Sydney, Australia, 2009.

MEC Juan de la Cierva post-doctoral research grant - IRI, Barcelona, Spain, 2006-2009.

AGAUR mobility grant - IRISA-Rennes, France, 2005.

MEC-FPU mobility grant - IRISA-Rennes, France, 2003.

MEC-FPU Ph.D. research grant - University of Girona, Spain, 2001-2004.

ERASMUS mobility grant - University of Ghent, Belgium, 1999-2000.

Professional Experience

February 2015 - December 2018. Research fellow
Australian Centre for Robotiv Vision (ACRV), the Australian National University (ANU) node, Canberra, Australia.

January 2012 - January 2015. Research scientist
Brno University of Technology (BUT), Brno, Czech Republic.

October 2010 - December 2011. Research scientist
Laboratory for Analysis and Architecture of Systems, LAAS-CNRS, Toulouse, France.

May 2009 - September 2010. Research scientist
Georgia Tech, Atlanta, USA - MICINN /FULBRIGHT mobility grant [1].

[1] Spanish Ministry of Science and Innovation (MICINN)

January 2007 - April 2009. Research scientist
Institut de Robotica i Informatica Industrial (IRI), Barcelona - "Juan de la Cierva" MEC grant [2].

May 2006 - December 2006. Research assistant
Institut de Robotica i Informatica Industrial (IRI), Barcelona, Spain.

May 2005 - April 2006. RnD Engineer
Icnita S.L., Girona, Spain - RFID technology research.

October 2000 - April 2005. Research scientist
Institute of Informatics and Applications (IIiA), Computer Vision and Robotics Group (VICOROB), University of Girona (UdG), Spain. "Formacin de Personal Universitario (FPU)" MEC grant [2].

Research Visits

January 2009 - February 2009. Research visit
Australian Centre for Field Robotics (ACFR), Sydney, Australia.

September 2004 - November 2004. Research visit
Institute de Recherche en Informatique et en Systemes Aleatoires (IRISA), Rennes, France.

February 2003 - April 2003. Research visit
Institute de Recherche en Informatique et en Systemes Aleatoires (IRISA), Rennes, France.

Teaching Experience

July 2017 - November 20167. Lecturer / Course Convenor
Robotics ENGN4627/6627, College of Engineering and Computer Science (CECS), ANU.

July 2016 - November 2016. Lecturer
Robotics ENGN4627/6627, College of Engineering and Computer Science (CECS), ANU.

July 2015 - November 2015. Lecturer
Robotics ENGN4627/6627, College of Engineering and Computer Science (CECS), ANU.

February 2014 - June 2014. Lecturer
Multimedia, Department of Computer Graphics and Multimedia, BUT.

August 2009 - January 2010. Assistant
3D Reconstruction and Mapping in Computer Vision, Robotics, and Augmented Reality, College of Computing, Georgia Tech.

October 2002 - January 2003. Teaching assistant
Computer Architecture, Departament d'Electrònica, Informtica i Automàtica (EIA), UdG.

October 2003 - January 2004. Teaching assistant
Digital Signal Processing, Departament d'Electrònica, Informtica i Automàtica (EIA), UdG.

Research Projects

Title: *Robotic Asparagus Harvesting*
Financed: Discovery Translation Fund
From: 10/18 to: present. PIs: Prof. Robert Mahony and Dr. Viorela Ila

Title: *ACR Centre of Excelence for Robotic Vision (ACRV)*
Financed: Australian Research Council
From: 17/02/15 to: present. PI: Prof. Peter Corke

Title: *IT4Innovations Structural Funds of the EU and Czech Republic state budget (IT4)*
Financed: Czech national (CZ.1.05/1.1.00/02.0070)
From: 2011 to: 2015. PI: Prof. Pavel Zemcik

Title: *Intelligent Management Platform for Advanced Real-Time Media Processes (IMPART)*
Financed: EU Seventh Framework Programme (EU-FP7 316564-IMPART)
From: 01/02/13 to: 01/02/15, PI: Prof. Josep Blat

Title: *Resilient Reasoning Robotic Co-operating Systems (R3-COP)*
Financed: ARTEMIS Joint Undertaking
From: 01/01/12 to: 01/02/13, PI: Prof. Pavel Zemcik

Title: *Multi-Role Shadow Robotic System for Independent Living (SRS)*
Financed: EU Seventh Framework Programme (EU-FP7 247772-SRS)
From: 01/01/10 to: 31/01/13, PI: Prof. Pavel Zemcik

Title: *RObots et Systmes Auto-adaptatifs Communicants Embarqus (ROSACE)*,
Financed: Fondation de coopération scientifique, Sciences et Technologies pour l'Aéronautique et l'Espace (RTRA-STAE)
From: 01/10/10 to: 30/12/11

Title: *Analysis and Motion Planning of Complex Robotic Systems*

[2]Spanish Ministry of Education (MEC)

Financed: Spanish Ministry of Education (MEC-DPI 2007-60858),
From: 01/10/07 to: 30/09/10, PI: Dr. Llus Ros

Title: *Ubiquitous Networking Robotics in Urban Settings (URUS)*
Financed: EU Sixth Framework STREP Programme (IST-FP6-STREP-045062) ,
From: 01/01/07 to: 12/12/09, PI: Prof. Alberto Sanfeliu

Title: *Reconstruccin y análisis del movimiento de grandes estructures robóticas y bioquímicas*
Financed: Comision de trabajo de los Pirineos,
From: 01/07 to: 12/08, PI: Dr. Josep. M Porta and Dr. Viorela Ila

Title: *Planificador de trayectorias para sistemas robotizados de arquitectura arbitraria(PLANNER)*
Financed: Spanish Ministry of Education (MEC-DPI 2004-07358)
From: 12/05 to: 03/08 PI: Dr. Lluis Ros and Dr. Viorela Ila

Title: *Integration of Robust Perception, Learning, and Navigation Systems in Mobile Robotics (NAVROB)*
Financed: Spanish Ministry of Education (MEC-DPI 2004-05414)
From: 13/12/04 to: 12/12/07 PI: Prof. Alberto Sanfeliu

Title: *Plataformas de experimentación en robotica submarina (PERSUB)*
Financed: Spanish Ministry of Science and Technology (MCYT-DPI2001-2311-C03-01)
From: 28/12/2001 to: 27/12/2004 PI: Prof. Joan Batlle

Participation in research groups

ACRV: ARC Centre of Excellence at ANU node

Robo@FIT: Research group at Brno Technical University

Graph@FIT: Research group at Brno Technical University

Robotique et Intelligence Artificielle (RIA): Research group at LAAS-CNRS

Robotique, Action et Perception (RAP): Research group at LAAS-CNRS

The Borg Lab: Research group at Center for Robotics and Intelligent Machines (RIM) at GaTech

ROBiri: Research group at Universitat Politecnica de Catalunya

VICOROB:Research group at Technological Innovation Network Center, Universitat de Girona

Students Suppervision

Phd students:

Jun Zhang: ANU (primary supervisor). Expected graduation 02/2019

Mina Henein: ANU (primary supervisor). Expected graduation 12/2018

Sean O'Brian: ANU (secondary supervisor). Expected graduation 12/2018

Marek Solony: BUT(primary supervisor). Graduated 09/2017

Master students:

Ziang Cheng: ANU. Expected graduation 2018

Yahui Wang: ANU. Graduated 2016

Vojtěch Šimetka: BUT. Graduated 2014

Honors students:

Michael Humphrey Cifuentes: ANU. Expected graduation 2018

Russ Webber: ANU. Expected graduation 2018

Katrina Ashton: ANU. Expected graduation 2018

James Burr: ANU. Graduated 10/2017

Yash Vyas: ANU. Graduated 10/2017

Francis Snelgar: ANU. Graduated 2016

Montiel Abello: ANU. Graduated 2015

Reviewer

1. International Journal of Robotic Research (IJRR)
2. IEEE Transactions on Robotics (TRO)
3. IEEE Robotics and Automation Letters (RA-L)
4. IEEE Robotics and Automation (RAS)
5. Robotics, Science and Systems (RSS)
6. European Conference on Computer Vision (ECCV)
7. IEEE International Conference on Robotics and Automation (ICRA)

8. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
9. IEEE/RAS European Conference on Mobile Robots (ECMR)
10. IFAC Symposium on Robot Control (SyRoCo)
11. IFAC 2017 World Congress

Open Source Software

Matlab toolbox for dynamic objects SLAM: Authors: Mina Henein, Montiel Abello, V.Ila
The toolbox is available at: `https://github.com/MinaHenein/do-slam`

SLAM++: Authors: L. Polok, M.Solony, V. Ila
A sparse-block matrix linear algebra library, available for download at: `www.sourceforge.net/projects/slam-plus-plus/`, currently having more than 3000 downloads and used by several international companies (e.g. Double Negative visual effects, Continental, NXP Semiconductors, suBmarine Open Technologies)

Matlab toolbox for smoothing and mapping: Authors: V.Ila, J.M. Porta
The toolbox is available for download at: `www.slam-optim-matlab.googlecode.com`

Matlab toolbox for Pose SLAM: Authors: V.Ila, J.M. Porta
The toolbox is available for download at: `www.iri.upc.edu/people/porta/Soft/TRO-Code.tar.gz`

Start-up

Together with Dr. J.M. Codol, I co-funded *suBmarine Open Technologies* start-up, which since 2011, is incubated at InnovUp center at Mining School in Alès, France. The project is about GPS-like positioning techniques for underwater navigation systems. The project was awarded with the first price in OSEO (Concours national d'aide à la création d'entreprises innovantes) competition with a financial support of 40,000 Euros.

Other Merits

Program committee ICRA2017 and Associate Editor (AE) IROS2018.

From 2010 to 2012, I was member of the program committee of Robotics: Science and Systems Conference, one of the most important conferences in robotics.

In 2010, together with colleagues from ACFR, Sydney and ETH, Zurich, we organised the workshop on Probabilistic Graphical Models in Robotics at the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2010).

Together with Dr. M. Kaess from Massachusetts Institute of Technology (MIT) and F. Maurelli from Heriot-Watt University we organised an Invited Session on Underwater Robotics at the same IROS 2010 international conference.

I have been invited for research visits and talks in several international research centres: Australian Centre for Field Robotics (ACFR) Sydney, Australia, Institut de Recherche en Informatique et Systèmes Aléatoires (IRISA), Rennes, France; Erasmus Mundus Masters in Vision and Robotics (ViBOT) Girona, Spain; Institut de Roboticá i Informatica Industrial (IRI), Barcelona, Spain; Computer Vision and Robotics Research Group (VICOROB) UdG, Monash University; Adelaide University.

I served as a consultant for companies Nav-on-Time in Toulouse, France and Czech internet company Seznam.cz and their product mappy.cz.

I was part of the organisation committee of the RoboVis, the ACRVs annual symposium in the Barossa Valley, South Australia, and RVSS(2016/2017/2018), annual ACRV summer school, Kioloa, NSW.

Publications

* Marks relevant publications.

Journals SCI

1. *V. Ila, L. Polok., M. Solony, P. Svoboda, "SLAM++. A Highly Efficient and Temporally Scalable Incremental SLAM Framework", International Journal of Robotic Research (IJRR), vol. 36, no. 2, pp. 210-230, 2017.
2. J. Blat, A. Evans, H. Kim, E. Imre, L. Polok, V. Ila, N. Nikolaidis, P. Zemcik, A. Tefas, P. Smrz, A. Hilton and I. Pitas. "Big Data Analysis for Media Production". IEEE Communication Letters, vol. 2015, no. 2, pp. 1-29, 2015.
3. *M. Kaess, H. Johannsson, R. Roberts, V. Ila, J. Leonard, F. Dellaert, "iSAM2: Incremental Smoothing and Mapping Using the Bayes Tree", International Journal of Robotic Research (IJRR), January 2012.
4. *V. Ila, J. M. Porta, and J. Andrade-Cetto, "Amortized Constant Time State Estimation in Pose and Hierarchical SLAM Using a Mixed Kalman-Information Filter", Robotics and Autonomous Systems (RAS) Vol. 59, Issue 5, Pages 310-318, May 2011.
5. *V. Ila, J. M. Porta, and J. Andrade-Cetto, "Information-based Compact Pose SLAM", Transactions on Robotics (TRO), vol. 26, no.1, pp. 78 93, 2010.

6. V. Ila, R. Garcia, "Interest Point Characterization through Textural Analysis for Rejection of Bad Correspondences", Pattern Recognition Letters (PRL), vol. 26, no 10 , pp. 1587 1596, Eds. Elsevier, 2005.
7. V. Ila, R. Garcia, F. Charot and J. Batlle, "FPGA Implementation of a Vision-Based Motion Estimation Algorithm for an Underwater Robot", Lecture Notes in Computer Science no. 3203, pp. 1152-1154, Eds. Springer-Verlag, 2004.
8. R. Garcia, X. Cuf and V. Ila, "Recovering Camera Motion in a Sequence of Underwater Images through Mosaicing", Lecture Notes in Computer Science no. 2652, pp. 255 262, Eds. Springer-Verlag, 2003.

Conferences

1. J. Zhang, V. Ila, "Multi-frame Motion Segmentation for Dynamic Scene Modelling", Australasian Conference on Robotics and Automation (ACRA),Canterbury, New Zealand, 2018.
2. S. OBrien, J. Trumpf, V. Ila, and R. Mahony, "A Geometric Observer for Scene Reconstruction Using Plenoptic Cameras", IEEE Conference on Decision and Control, Miami Beach, FL, USA, December 17-19, 2018.
3. S. OBrien, J. Trumpf, V. Ila, and R. Mahony, "Calibrating Focused Light-Field Cameras Using Plenoptic Disc Features", In Proceedings of the 6th international conference on 3D Vision (3DV), to appear, September, 2018.
4. M. Henein, G. Kennedy, V. Ila and R. Mahony,"Exploiting Rigid Body Motion for SLAM in Dynamic Environments with Applications in Urban Driving and Extrinsic Calibration of a Multi RGBD Camera System", ICRA Workshop on "Representing a Complex World: Perception, Inference, and Learning for Joint Semantic, Geometric, and Physical Understanding", Brisbane, Australia, 2018.
5. J. Zhang, V. Ila, "Robust Visual Odometry in Underwater Environment", MTS/IEEE Oceans 2018, Kobe, Japan, 2018.
6. * V. Ila, L. Polok., M. Solony, K. Istenic, "Fast Incremental Bundle Adjustment with Covariance Recovery", International Conference on 3D Vision (3DV), Quingdao, China, 2017 (Best Paper Honourable Mention Award).
7. M. Henein, M. Abello, V. Ila and R. Mahony "Exploring The Effect of Meta-Structural Information on the Global Consistency of SLAM", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Vancouver, Canada, 2017.
8. K. Istenic, V. Ila, L. Polok, N. Gracias, R. Garcia "Mission-time 3D Reconstruction with Quality Estimation", MTS/IEEE Oceans 2017 Aberdeen, UK, 2017 (Best Student Poster Award).
9. L. Polok, V. Ila and P. Smrz, "3D Reconstruction Quality Analysis and Its Acceleration on GPU Clusters", In: Proceedings of the European Signal Processing Conference (EUSIPCO), Budapest 2016.
10. L. Polok, V. Lui, V. Ila, T. Drummond, R. Mahony, "The Effect of Different Parameterisations in Incremental Structure from Motion", In: Proceedings of the Australasian Conference on Robotics and Automation (ACRA), Canberra, 2015.
11. L. Polok, V. Ila and P. Smrz, "Fast Sparse Matrix Multiplication on GPU", In: Proceedings of the 23rd High Performance Computing Symposia (HPC). Association for Computing Machinery, pp. 1-8, Alexandria, US, 2015.
12. S. Pabst, H. Kim, L. Polok, V. Ila, T. Waine, A. Hilton, J. Clifford, P. Smrz, "Multi-Modal Big Data Management in Digital Film Production". The 42nd International Conference and Exhibition on Computer Graphics and Interactive Techniques (SIGGRAPH), Los Angeles, 2015.
13. * V. Ila, L. Polok., M. Solony, P. Zemcik and P. Smrz, "Fast Covariance Recovery in Incremental Nonlinear Least Square Solvers", In: Proceedings of IEEE International Conference on robotics and Automation (ICRA), pp. 1-8, Seattle, US, 2015.
14. L. Polok, V. Ila and P. Smrz, "Fast Sparse Matrix Multiplication on GPU", In: Proceedings of the 23rd High Performance Computing Symposia (HPC). Association for Computing Machinery, pp. 1-8, Alexandria, US, 2015.
15. L. Polok, V. Ila, M. Solony, P. Zemcik, P. Smrz, "A GPU-Accelerated Bundle Adjustment Solver", NVIDIA Helsinki Ltd, GPU Technology Conference (GTC), San Jose, 2015.
16. M. Solony, E. Imre, V. Ila, L. Polok, H. Kim and P. Zemcik, "Fast and Accurate Refinement Method for 3D Reconstruction from Stereo Spherical Images", In: Proceedings of the 10th International Conference on Computer Vision Theory and Applications, pp. 1-8, Berlin, Ge, 2015.

17. L. Polok, V. Ila and P. Smrz, "Fast Radix Sort for Sparse Linear Algebra on GPU",In: Proceedings of the 22nd High Performance Computing Symposia (HPC). Association for Computing Machinery, pp. 1-8, Tampa, US, 2014.
18. * L. Polok, V. Ila, M. Solony, P. Zemcik, P. Smrz, "Incremental Block Cholesky Factorization for Nonlinear Least Squares in Robotics", In: In proceedings of The Robotics: Science and Systems 2013 Conference (RSS), Berln, Germany, 2013.
19. L. Polok, M. Solony, V. Ila, P. Zemcik, P. Smrz, "Incremental Cholesky Factorization for Least Squares Problems in Robotics", In: Proceedings of The IFAC Intelligent Autonomous Vehicles Symposium (IAV), Gold Coast, Australia, 2013.
20. L. Polok, V. Ila, P. Smrz, "Cache Efficient Implementation for Block Matrix Operations", In: Proceedings of the 21st High Performance Computing Symposia (HPC), San Diego, US, 2013.
21. L. Polok, M. Solony, V. Ila, P. Zemcik, P. Smrz, "Efficient Implementation for Block Matrix Operations for Nonlinear Least Squares Problems in Robotic Applications", In: Proceedings of IEEE International Conference on Robotics and Automation (ICRA), Karlsruhe, Ge, 2013.
22. * M. Kaess, H. Johannsson, R. Roberts, V. Ila, J. Leonard, F. Dellaert, "iSAM2: Incremental Smoothing and Mapping with Fluid Relinearization and Incremental Variable Reordering", In Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), Shanghai, China, 2011.
23. M. Kaess, V. Ila, R. Roberts, and F. Dellaert, "The Bayes Tree: An Algorithmic Foundation for Probabilistic Robot Mapping", Intl. Workshop on the Algorithmic Foundations of Robotics (WAFR), Singapore, 2010.
24. * F. Dellaert, J. Carlson, V. Ila, K. Ni and C. E. Thorpe, "Subgraph-preconditioned Conjugate Gradients for Large Scale SLAM", In Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Taipei, Taiwan, 2010.
25. C. Beall, B. Lawrence, V. Ila, and F. Dellaert, "3D Reconstruction of Underwater Structures", In Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems, Taipei, Taiwan, 2010.
26. V. Ila, Josep M. Porta and J. Andrade-Cetto, "Reduced State Representation in Delayed-State SLAM, "IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), St. Luis, USA, 2009.
27. V. Ila, Josep M. Porta and J. Andrade-Cetto, "Amortized Constant Time State Estimation in SLAM using a Mixed Kalman-Information Filter", IEEE European Conference of Mobile Robotics (ECMR), Croatia, 2009.
28. V. Ila, J. Andrade-Cetto, R. Valencia and A. Sanfeliu, "Vision-based loop Closing for Delayed State Robot Mapping", In Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), San Diego, USA, November 2007.
29. V. Ila, J. Andrade-Cetto and A. Sanfeliu, "Outdoor Delayed-State Visually Augmented Odometry. In Proceedings of the 6th IFAC/EURON Symposium on Intelligent Autonomous Vehicles (IAV), Toulouse, September 2007.
30. V. Ila, R.Garcia and F.Charot, "VLSI Architecture for an Underwater Robot Vision System", OCEANS Europe, Brest, France, June 2005.
31. V. Ila, R. Garcia, F. Charot, J. Batlle, "Proposal of a Parallel Architecture for a Motion Detection Algorithm", International Conference on Pattern Recognition (ICPR2004), Camridge, UK, 2004.
32. V. Ila, R. Garcia, J. Batlle, "Reconfigurable Architecture to Estimate the Motion of an Underwater Vehicle" International Conference on Automation, Quality and Testing, Robotics (AQTR2004), Cluj-Napoca, Romania, May 2004.
33. V. Ila, R. Garcia, F. Charot and J. Batlle, "FPGA Implementation of a Vision-Based Motion Estimation Algorithm for an Underwater Robot", Field Programmable Logic and its Applications (FPL), Antwerp, Belgium, August 2004.
34. V. Ila, J. Batlle, X. Cufi, R Garcia, "New Trends in FPAA Devices", International Workshop on Systems, Signals and Image Processing (IWSSIP2002), Manchester, UK, November 2002.
35. V. Ila, P. Ridao and J. Batlle, "A New Parallel Architecture to Deal With Real-Time Computer Image Processing International Workshop on Systems, Signals and Image Processing (IWSSIP2001), Bucharest, Romania, June 2001.
36. V. Ila, P.Ridao, J. De La Cruz and J.Batlle, "mplementation of a Real-time Target Tracking Behaviour Using Video Sensors", IFAC Conference on Control Applications in Marine Systems (CAMS), Glasgow, Scotland, U.K, 2001.

37. J. Batlle, P. Ridao, M. Carreras, V. Ila, “Toward Cooperative Underwater Robots for Ecological Surveillance of Marine and Underwater Environments”, Workshop on European Scientific and Industrial Collaboration (WESIC) Enschede, Holand, 2001.