

# José Santos-Victor

## Curriculum Vitae

Associate Professor

Instituto Superior Técnico - Institute for Systems and Robotics  
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### Education

- [2005] "Agregação" in Electrical and Computer Engineering, Instituto Superior Técnico, Technical University of Lisbon.
- [1995] PhD in Electrical and Computer Engineering, Instituto Superior Técnico, Technical University of Lisbon.
- [1991] MSc Electrical and Computer Engineering, Instituto Superior Técnico, Technical University of Lisbon.
- [1988] Licenciatura (5-year) in Electrical and Computer Engineering, Instituto Superior Técnico, Technical University of Lisbon.

### Academic Positions

**Associate Professor** in the area of Systems and Control, Electrical and Computer Engineering, Instituto Superior Técnico., since Nov. 2002.

**Assistant Professor**, Systems and Control, Electrical and Computer Engineering, Instituto Superior Técnico., Fev. 1995 - Nov. 2002.

**Teaching Assistant**, Systems and Control, Electrical and Computer Engineering, Instituto Superior Técnico., Oct. 1988-Feb. 1995.

### Professional Activities

Researcher at the Institute for Systems and Robotics, ISR, since 1992.

Project evaluation for the European Union, in the areas of vision and robotics.

National delegate to the Aurora Programme, for the robotic and human exploration of the solar system, of the European Space Agency (ESA).

#### Editorial Board

Journal of Robotics and Autonomous Systems, Elsevier, Jan. 1998 - July 2001.

IEEE Transactions on Robotics, June 2005 -

#### Awards

Best paper award, British Machine Vision Conference - BMVC98 (E. Grossmann, J. Santos-Victor, *The Precision of 3D Reconstruction from Uncalibrated Views*), September 1998.

## Concluded PhD Theses Supervision

- i. César Silva, "*3D Motion and Dense Structure Estimation: Representations for Visual Perception and the Interpretation of Occlusions*," IST, May 2001.
- i. Niall Winters, "*An Holistic approach to Topological Navigation using Omnidirectional Vision*," Trinity College, Dublin, Ireland, Jan. 2002.
- i. Etienne Grossmann, "*3D Reconstruction of Structured Scenes from one or more views*," IST, Oct. 2002.
- i. José Gaspar. "*Omnidirectional Vision for Mobile Robot Navigation*," IST, May 2003
- i. Nuno Gracias. "*Mosaic-based Visual Navigation for Autonomous Underwater Vehicles*," IST June 2003.
- i. Alexandre Bernardino. "*Binocular Head Control with Foveal Vision: Methods and Applications*," IST Feb. 2004.
- i. Raquel Frizzera Vassallo. "*Uso de mapeamentos visuomotores com imagens omnidireccionais para aprendizagem por imitação em robótica*," Ph.D Thesis, Universidade Federal do Espírito Santo, UFES, Brasil, September 2004.
- i. Manuel Cabido Lopes, "*A developmental approach for learning by imitation in robots*," IST May. 2006.

## International (European union) Projects

<b>Project :</b>	CONTACT - Learning and Development of Contextual Action.		
<b>Function:</b>	Principal Investigator on behalf of IST/ISR		
<b>Reference:</b>	NEST-5010	<b>Data:</b>	Sept. 2005 - August 2008
<b>Description:</b>	As infants, each one of us developed the ability to move our muscles to manipulate objects and also to communicate with gestures and speech. Did we learn to perceive and produce gestures for manipulation and speech independently, or are these two learning processes linked? The CONTACT project is an ambitious attempt to investigate the parallel development of manipulatory and speech-related motor acts from a multi-disciplinary perspective. The project is designed to test the hypothesis that fundamentally similar mechanisms are involved in the development of perception and production for both speech and manipulation. This hypothesis is stimulated by recent evidence suggesting that the human brain interprets motor acts (movements) of other people in essentially the same way, regardless of whether the act generates speech or a manipulative gesture.		
<b>Partners:</b>	IST, DIST, U.Genova (I); Dpt Psychology U. Uppsala (SE); Dept Human Physiology, U. Ferrara (I); U. Stockholm (SE).		

<b>Project :</b>	ROBOT-CUB - ROBotic Open-architecture Technology for Cognition, Understanding, and Behaviour.		
<b>Function:</b>	Principal Investigator on behalf of IST/ISR		
<b>Reference:</b>	IST-2004-004370	<b>Date:</b>	Sept. 2004 - August 2009
<b>Description:</b>	The main goals of RobotCub are two: (1) to create an open robotic platform for embodied research that can be taken up and used by the research community at large to further their particular approach to the development of humanoid-based cognitive systems, and (2) to advance our understanding of several key issues in cognition by exploiting this platform in the investigation of cognitive capabilities. The scientific objective of RobotCub is, therefore, to jointly design the mindware and the hardware of a humanoid platform to be used to investigate human cognition and human-machine interaction. We call this platform CUB or Cognitive Universal Body. It is worth remarking that the results of RobotCub will be fully open and consequently licensed following a General Public (GP) license to the scientific community.		
<b>Partners:</b>	IST, DIST, U.Genova (I), Arts Lab SSS. Anna (I), AI Lab U. Zurich (CH); Dpt Psychology U. Uppsala (SE); Dept Human Physiology, U. Ferrara (I); U.Hertfordshire (UK); U. Salford (UK); EPFL (CH); Telerobot S.r.l. (I); European Brain Research Institute (I)		

<b>Project :</b>	CAVIAR - Context Aware Vision using Image-based Active Recognition		
<b>Role:</b>	Principal Investigator on behalf of IST/ISR		
<b>Reference:</b>	IST-2001-27540	<b>Date:</b>	Sept. 2002 - Aug. 2005
<b>Description:</b>	Development of a vision system with cognitive capabilities. Target application are surveillance systems able to recognize the observed activities.		
<b>Partners:</b>	IST, University of Edimburgh (UK), INRIA (I)		

<b>Project :</b>	MIRROR - Mirror Neurons for Recognition		
<b>Role:</b>	Principal Investigator on behalf of IST/ISR		
<b>Reference:</b>	IST-2000-28159	<b>Date:</b>	Sept. 2001 - Aug. 2004
<b>Description:</b>	Development of an artificial (embodied) system able to learn how to communicate with humans based on gesture interpretation. This study aims to help understand the mechanisms and representations in the brain that facilitate imitation.		
<b>Partners:</b>	IST, DIST - University of Genova (I), University of Uppsala (SE), Univ. Ferrara, (I)		

<b>Project :</b>	OMNIVIEWS - Omnidirectional Visual System		
<b>Role:</b>	Principal Investigator on behalf of IST/ISR		
<b>Reference:</b>	EU FET - 1999-29017	<b>Date:</b>	Set. 2000 - Set. 2001

<b>Description:</b>	Integration of optic, optoelectronics, hardware, image processing and computer vision to design an advanced vision sensor resulting from the combination of a catadioptric omnidirectional camera and a space variant (log-polar) image sensor.
<b>Partners:</b>	IST, DIST - University of Genova (I), Czech Technical University (CR).

<b>Project :</b>	NARVAL - Navigation of Autonomous Robots Via Active Environmental Perception		
<b>Role:</b>	Project coordinator		
<b>Reference:</b>	Esprit LTR Project - 30185	<b>Date:</b>	Oct. 1998 - Dec.. 2001
<b>Description:</b>	Development of a perception based navigation system for autonomous navigation in unstructure environments, as in the underwater scenario.  Autonomous navigation based on visual servoing upon a previously build video mmosaic was demonstrated at sea.		
<b>Partners:</b>	IST, I3S (Laboratoire d' <i>Informatique, Signaux e Systèmes de Sophia Antipolis</i> - CNRS- Université de Nice Sophia Antipolis) (FR), Thomson Sintra ASM (FR) e DIST - University of Genova (I).		
<b>Project :</b>	VIRSBS - Visual Intelligent Recognition for Secure Banking Services		
<b>Role:</b>	Principal Investigator on behalf of IST/ISR together with Prof. João Costeira (DEEC-IST)		
<b>Reference:</b>	Esprit LTR - Proj. 21894	<b>Date:</b>	Nov. 1996- Feb. 1999
<b>Description:</b>	Development of an active visin system able to validade the identity of users in bank teller machines, relying on visual (biometric) data.		
<b>Partners:</b>	ISR/IST, DIST - Università di Genova (coordinator - I), École Polytechnique Fédérale de Lausanne (CH), Maynouth College (IR).		

<b>Project :</b>	VIRTUOUS - Autonomous Acquisition of Virtual Reality Models from Real World Scenes		
<b>Role:</b>	Principal Investigator on behalf of IST/ISR		
<b>Reference:</b>	Inco-Copernicus Proj. 960174	<b>Date:</b>	Jan. 1997 - Dec. 1999
<b>Description:</b>	Extraction of 3D models of objects or scenes to be used in virtual reality systems with applications in advanced training with robotic systems.		
<b>Partners:</b>	IST, Centre for Vision, Speech and Signal Processing (University of Surrey, UK - coordinator), Institute of Control Theory and Robotics (Slovak Academy of Sciences, Slovakia), Institute of Information Theory and Automation (Czech Academy of Sciences, Czech Republic).		

## Journal Publications

1. J. Santos Victor, J.P. Costeira, J. Tomé e J. Sentieiro, "A Computer Vision System for the Characterization and Classification of Flames in Glass Furnaces," *IEEE Transactions on Industry Applications*, May/June 1993.
2. J. Santos Victor, G. Sandini, F. Curotto e S. Garibaldi, "Divergent Stereo for Robot Navigation: A step forward to a Robotic Bee," *International Journal of Computer Vision*, (14), Kluwer Academic Press, March 1995.
3. J. Santos Victor e G. Sandini, "Uncalibrated Obstacle Detection using Normal Flow *Machine Vision and Applications*, Vol 9(3) pp 130–127, Springer International, 1996.
4. J. Santos Victor e G. Sandini, Visual Behaviors for Docking, *Computer Vision and Image Understanding*, Academic Press, 67(3), September 1997.
5. J. Santos Victor e G. Sandini, Embedded Visual Behaviors for Navigation, *Robotics and Autonomous Systems*, 19(3-4), Elsevier, March 1997.
6. E. Grossmann e J. Santos Victor, Performance Evaluation of Optic Flow Estimators: Assessment of a new Affine flow method, *Robotics and Autonomous Systems*, 21(1), Elsevier, July 1997
7. C. Silva e J. Santos-Victor, Robust Egomotion Estimation from the Normal Flow, using Search Subspaces, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 19(9), September 1997
8. M.J. Rendas, J. Santos-Victor, J.-Y. Tigli, I. Lourtie, L. Pronzato, A. Bernardino and M. Ribo, Uncertainty Modeling and Perceptual Guiding for Safe Operation in Unknown Environments, *International Journal of Intelligent Control Systems*, July 1998.
9. A. Bernardino, J. Santos-Victor, Visual Behaviours for Binocular Tracking, *Robotics and Autonomous Systems*, Elsevier, (25), 1998.
10. J. Santos-Victor, Vision based control of cellular Robots, *Robotics and Autonomous Systems*, Elsevier, (23)4, 1998.
11. A. Bernardino, J. Santos-Victor, Binocular Visual Tracking: Integration of Perception and Control, *IEEE Transactions on Robotics and Automation*, Vol 15, 6, Dec. 1999.
12. E. Grossmann, J Santos-Victor, Uncertainty Analysis of 3D Reconstruction from Uncalibrated Views, - *Image and Vision Computing*, 18(9), Elsevier, May 2000.
13. R. Vassallo, H. Schneebeli, J. Santos-Victor, Visual Servoing and Appearance for Navigation *Robotics and Autonomous Systems* Vol 31(1-2), Elsevier, May 2000.
14. N. Gracias, J. Santos-Victor, Underwater Video Mosaics and visual navigation maps, *Computer Vision and Image Understanding*, Vol 79(1), Academic Press, July 2000.
15. J. Gaspar, N. Winters, J. Santos-Victor, Vision-based Navigation and Environmental Representations with an Omnidirectional Camera, *IEEE Transactions on Robotics and Automation*, Vol 16(6), Dec. 2000.

16. C. Silva J. Santos-Victor, Motion from Occlusions, *Robotics and Autonomous Systems*, Elsevier, 35(3-4) June 2001.
0. N. Gracias, José Santos-Victor, Trajectory Reconstruction with Uncertainty Estimation using Mosaic Registration, *Robotics and Autonomous Systems*, Elsevier, 35(3-4) June 2001
0. S. van der Zwaan, A. Bernardino, J. Santos-Victor, Visual station keeping for floating robots in unstructured environments, *Robotics and Autonomous Systems* Elsevier, 39(3-4), June 2002.
0. A. Bernardino, J. Santos-Victor, G. Sandini, Foveated Active Tracking with Redundant 2D Motion Parameters, *Robotics and Autonomous Systems*, Elsevier, 39(3-4), June 2002.
0. N. Winters, J. Santos-Victor, Information Sampling for vision-based robot navigation, *Robotics and Autonomous Systems*, Elsevier, 41(2-3), Nov. 2002.
0. N. Gracias, S. van der Zwaan, A. Bernardino, J. Santos-Victor, "Mosaic Based Navigation for Autonomous Underwater Vehicles," *IEEE Journal of Oceanic Engineering*, Oct. 2003.
0. M. Cabido Lopes, J. Santos-Victor, "Visual learning by imitation with motor representations," *IEEE Transactions on Systems, Man and Cybernetics*, special issue on Learning in Computer Vision and Pattern Recognition, , v35(3), June 2005
0. E. Grossmann, J. Santos-Victor, "Least Squares 3-D Reconstruction from One or More Views and Geometric Clues," V.99(2), *Computer Vision and Image Understanding*, v.99(2) June 2005.
0. José Melo, Andrew Naftel, , Alexandre Bernardino, José Santos-Victor, "Detection and Classification of Highway Lanes Using Vehicle Motion Trajectories", *IEEE Transactions on Intelligent transportation Systems*, Vol. 7, No 2, June 2006.
0. Alexandre Bernardino, José Santos-Victor, Fast Isotropic 2D Gabor Filters for Image Analysis, *IEEE Transactions on image Processing*. Accepted for publication, 2006.