

**Siniša Šegvić**  
Grada Chicaga 19, 10000 Zagreb, Croatia  
<http://www.zemris.fer.hr/~ssegvic>  
[sinisa.segvic@fer.hr](mailto:sinisa.segvic@fer.hr)  
Tel. 385–1–6111784

## Education

- PhD Computer Science (dr.sc.), Faculty of Electrical Engineering and Computing (FER), Zagreb, Croatia, 2004
  - thesis topic: multiagent architectures for distributed computer vision;
  - major subproject: designing and implementing reusable portable infrastructure for computer vision applications;
  - important achievements in the context of the proposal: intrinsic calibration, extrinsic calibration by pose estimation, object tracking by active vision.
- MS Computer Science (mr.sc), FER, Zagreb, Croatia, 2000
  - thesis topic: interpretation of indoor scenes using active computer vision;
  - important achievements in the context of the proposal: vanishing point detection, mobile robot localization.
- BS Computer Science (dipl.inž.) FER, Zagreb, Croatia, 1996
  - thesis topic: design and evaluation of a behavioural model for a RISC microprocessor within Mentor Graphics EDA environment.
- A high school year abroad: civica scuola media Alessandro Manzoni, Milano, Italy, 1985–1986.

## Work experience

- Assistant professor, Department of Electronics, Microelectronics, Computer and Intelligent Systems, FER, Croatia, February 2008–
  - *Research*
    - \* Computer vision: multi-view geometry, dynamic scene analysis (especially from moving vehicles), robotic applications
  - *Education*
    - \* Graduate courses: Dynamic scene analysis
    - \* Student theses: Computer vision, Software architecture
    - \* Undergraduate courses: Design Patterns in Software Engineering, Scripting languages
- Marie Curie International incoming fellowship, the Visual geometry group, Institute of Electrical Measurement and Measurement Signal Processing, TU Graz, Austria, September 2006– September 2007.

– *Research achievements*

- \* Performance evaluation of closed-form approaches for recovering the relative orientation [20, 18, 19];
  - \* collaboration on real-time structure and motion estimation for general camera models [5];
  - \* dissemination of the results from the previous post-doc position [14, 13, 15];
  - \* work in progress on providing groundtruth motion for evaluating algorithms for structure and motion estimation
- Postdoctoral research fellow, the Lagadic group, Irisa/Inria Rennes, France, July 2005–July 2006.

– *Research achievements*

- \* Improving the differential tracker in environments with many surface discontinuities [12];
  - \* formulating and solving the point transfer problem within the calibrated context.
  - \* a working large-scale vision-only outdoor navigation system [13, 1, 2, 15]; the key-feature is a relaxed dependency on the global consistency of the environment representation [14]
- Teaching assistant, Laboratory for Artificial Intelligence, FER, Croatia, 1996–2004

– *Research achievements*

- \* 2002–2004: Distributed visual tracking system [17, 9]
  - autonomous robots are tracked using several active cameras;
  - each camera is assigned a dedicated computer (observer) which processes images in real time (12 Hz), and sends results over a TCP connection to the common server managing the common view; for details, please see: <http://www.zemris.fer.hr/~ssegvic/macv/en/>
  - additional work was performed on devising strategies for coordinating observers' responsibilities, and augmenting the architecture with multi-level hierarchy, autonomous robot controllers and mobile observers;
  - the project has been supported by the Croatian Ministry of Science and Technology, Contract Number 2001-072.
- \* 2000–2002: Real time tracking of small moving targets
  - targets were found by detecting closed chains of edge elements obtained by Canny edge detector;
  - the robustness of the procedure was improved by allowing a small number of gaps within the contour;
  - near real time performance (12 Hz) was achieved by special considerations for optimized implementation of the critical algorithms;
  - the procedure was consequently generalized into a general object segmentation technique based on perceptual grouping [10].
- \* 1996–1999: Self-localization in indoor environments [6, 7, 16]

- a software system for determining position of a robot within a system of corridors based on perceived position of vanishing points for different viewing directions;
- straight line segments in the image were detected by Hough transform;
- corridor directions were found by explicit clustering of viable vanishing point candidates, obtained for many viewing directions.
- \* 1996–1997: A system for tracking laboratory animals [4]
  - the segmentation of images acquired under changing lighting conditions was performed using locally adaptive thresholding procedure.
- *Other software projects*
  - \* 2000–2004: Computer vision shell (cvsh) [11]
    - a testbed for experimenting with image processing procedures;
    - provides textual user interface, handles image acquisition (file or grabber) and presentation of results (window or file);
    - user procedures plug in as dynamic libraries specified either from command line or interactively;
    - consists of efficient, portable and reusable C++ components: the shell operates on Linux (gcc, icc), MS Windows (gcc, msvc) and MacOS X (gcc);
    - some of the components were written by other colleagues, while most of them were designed and implemented by me, with a little help from my friends;
    - the shell has been used by several colleagues and many students performing research in the field of computer vision.
  - \* 2003–2004: Active vision framework (avf)
    - similar to cvsh, but suited for systems in which image acquisition process is actively controlled by the application logic;
    - provided user procedures include internal and external camera calibration.
  - \* 2000–2004: Automated build configuration framework
    - a collection of Python programs for managing a set software projects;
    - the above three projects specify ~20 targets (executable programs, dynamic libraries and test drivers), while the common source tree consists of ~50000 lines of C++ code in ~400 files stored in a subversion repository: the framework ensures automatic retrieval of source files and makefile generation for each target on each software platform (CPU, OS, compiler);
    - such framework is indispensable if extensive unit testing is to be used in a heterogeneous environment.
  - \* 2004: Sokoban solver
    - an educational program for solving simpler levels of the Sokoban puzzle.
- *UNIX system administration*
  - \* 2003–2004: research lab with 4 Linux, 1 MacOS X and 5 WinXP machines; the Debian server provides common authentication via LDAP and file sharing via samba; the security policy combines ssh, nmap checking, IP filtering and TCP wrappers;

- \* 2000–2001: research lab with 3 Tru64 Unix machines; the setup included NIS authentication and NFS file sharing.
- *Education*
  - \* participation in the laboratory coursework: Intelligent Systems (Prolog), Digital System Design (VHDL), Digital Electronics (VHDL), Computer Architecture (MC680x0 assembler);
  - \* participation in lecturing: Intelligent Systems (2004);
  - \* design of laboratory assignments in Prolog (1997) and VHDL (2001);
  - \* automatic generation of personalized written exams (team effort, 2004–2005):
    - several approaches are independently evaluated: my design involved pdf output from a textual database using Python and T<sub>E</sub>X with related tools.
- Software Engineer, MultiCom, Zadar, Croatia, 1994–1995
  - Application development (three developers): ISDN adapter interface, vt100 and videotex (BTX) terminal emulation, address book, fax printer driver;
  - MS Windows 3.1, MS Visual C++.
- Programming languages: C++, C, Python, Bash, Perl, VHDL, Prolog, T<sub>E</sub>X (L<sup>A</sup>T<sub>E</sub>X).
- Operating systems: Linux (Redhat 7.x, 9.0; Suse 9.0, Debian Sarge), Tru64 Unix, MS Windows 3.1–XP, MacOS X.
- Natural languages: Croatian, English (8/10), French(6/10), Italian (7/10), German (2/10).

### **Research project participation**

- Marie Curie International incoming fellowship, project AviCMaL 2006–2007, EU FP6
- Predit Mobivip (Individual Public Vehicles for Mobility in the City), 2005–2006, French Ministry of Transports.
- Robea Bodega, 2005–2006, French National Center for Scientific Research.
- A Knowledge-Based System for Interpretation of Animal Behaviour, 1996–2002, Croatian Ministry of Science #036022;
- Interpretation of blocks world scenes, 1997, Croatian academic and research network;
- Multiagent Systems for Interpretation of Dynamic Scenes, 2002–2006, Croatian Ministry of Science #036025;
- Educational Project: Intelligent Systems, 2002, Croatian academic and research network.

### **Project leadership**

- Multiagent active computer vision, 2002, Croatian Ministry of Science #2001-072.

## Scientific publications

- [1] Albert Diosi, Anthony Remazeilles, Siniša Šegvić, and François Chaumette. Experimental evaluation of an urban visual path following framework. In *Proceedings of the IFAC Symposium on Intelligent Autonomous Vehicles*, Toulouse, France, September 2007.
- [2] Albert Diosi, Anthony Remazeilles, Siniša Šegvić, and François Chaumette. Outdoor visual path following experiments. In *Proceedings of the International Conference on Intelligent Robots and Systems*, pages 4265–4270, San Diego, CA, October 2007.
- [3] Slobodan Ribarić, Goran Adrinek, and Siniša Šegvić. Real-time active visual tracking system. In *Proceedings of the Mediterranean Electrotechnical Conference*, pages 231–234, Dubrovnik, Croatia, May 2004. IEEE.
- [4] Slobodan Ribarić, Siniša Šegvić, and Vladimir Špišić. Locally adaptive thresholding of the sequence of image frames. In *Proceedings of the Mediterranean Electrotechnical Conference*, pages 673–676, Lemesos, Cyprus, May 2000.
- [5] Gerald Schweighofer, Siniša Šegvić, and Axel Pinz. Online/realtime structure and motion for general camera models. In *IEEE WACV*, Copper, CO, January 2008.
- [6] Siniša Šegvić. Robust extraction of line segments from colour images by an iterative weighted polarised hough transform. In *Proceedings of 21<sup>th</sup> International Convention MIPRO '98*, volume 2, pages 35–38, Opatija, Croatia, May 1998.
- [7] Siniša Šegvić. Using projective geometry and active vision for scene interpretation, (in croatian). Master's thesis, Fakultet elektrotehnike i računarstva, Zagreb, Croatia, May 2000.
- [8] Siniša Šegvić. Detecting salient curvature features using the local control of the feature support. In *Proceedings of the Mediterranean Electrotechnical Conference*, pages 61–65, Cairo, Egypt, May 2002. IEEE.
- [9] Siniša Šegvić. *Multi-agent Object Tracking by Active Vision*, (in Croatian). PhD thesis, Fakultet elektrotehnike i računarstva, Zagreb, Croatia, June 2004.
- [10] Siniša Šegvić, Zoran Kalafatić, and Slobodan Ribarić. Extracting the canonical set of closed contours using the best-first search algorithm. In *Proceedings of 1<sup>st</sup> International Symposium on Signal Processing and Information Technology*, pages 141–146, Cairo, Egypt, December 2001.
- [11] Siniša Šegvić, Zoran Kalafatić, and Vladimir Stanisavljević. A software architecture for image acquisition and camera control in an active computer vision system. In *Proceedings of 22<sup>nd</sup> International Conference on Information Technology Interfaces*, volume 2, pages 183–188, Pula, Croatia, June 2000.
- [12] Siniša Šegvić, Anthony Remazeilles, and François Chaumette. Enhancing the point feature tracker by adaptive modelling of the feature support. In *Proceedings of the European Conference on Computer Vision*, pages 112–124, Graz, Austria, May 2006.
- [13] Siniša Šegvić, Anthony Remazeilles, Albert Diosi, and François Chaumette. A framework for scalable vision-only navigation. In *Proceedings of Advanced Concepts for Intelligent Vision Systems*, Delft, Netherlands, August 2007.
- [14] Siniša Šegvić, Anthony Remazeilles, Albert Diosi, and François Chaumette. Large scale vision based navigation without an accurate global reconstruction. In *Proceedings of the Conference on Computer Vision and Pattern Recognition*, Minneapolis, Minnesota, June 2007.
- [15] Siniša Šegvić, Anthony Remazeilles, Albert Diosi, and François Chaumette. A scalable mapping and localization framework for robust appearance-based navigation. submitted to CVIU, 2007.
- [16] Siniša Šegvić and Slobodan Ribarić. Determining the absolute orientation in a corridor using projective geometry and active vision. *IEEE Transactions on Industrial Electronics*, 48(3):696–710, 2001.
- [17] Siniša Šegvić and Slobodan Ribarić. A software architecture for distributed visual tracking in a global vision localization system. *Lecture Notes on Computer Science*, 2626:365–376, January 2003.
- [18] Siniša Šegvić, Gerald Schweighofer, and Axel Pinz. Influence of numerical conditioning on the accuracy of relative orientation. In *Proceedings of the International ISPRS workshop BenCOS*, held in conjunction with CVPR2007, Minneapolis, Minnesota, June 2007.

- [19] Siniša Šegvić, Gerald Schweighofer, and Axel Pinz. Performance evaluation of closed-form approaches for recovering the relative orientation. submitted to PAMI, 2007.
- [20] Siniša Šegvić, Gerald Schweighofer, and Axel Pinz. Performance evaluation of the five-point relative pose with emphasis on planar scenes. In *Proceedings of the workshop of the Austrian Association for Pattern Recognition*, pages 33–40, Schloss Krumbach, Austria, May 2007.

(for a more comprehensive list, please see <http://www.zemris.fer.hr/~ssegvic/pubs.html>)

### **Educational publications and seminars**

- Introduction to Prolog, in Croatian, 2000–2005,  
<http://www.zemris.fer.hr/~ssegvic/pubs/prolog.pdf>
- Introduction to VHDL, in Croatian, 2002–2004,  
<http://www.zemris.fer.hr/~ssegvic/pubs/vhdl-cm.pdf>
- Seminar on Camera calibration, in Croatian, 2003,  
<http://www.zemris.fer.hr/~ssegvic/pubs/umjeravanje.pdf>

### **References and other information**

- the names and contact information of references are available upon request