Intelligent Robots and Computer Vision XXIX: Algorithms and Techniques

Juha Röning
David P. Casasent
Editors

23–24 January 2012
Burlingame, California, United States

Sponsored and Published by
IS&T—The Society for Imaging Science and Technology
SPIE

Volume 8301

Proceedings of SPIE, 0277-786X, v. 8301
Contents

vii Conference Committee

SESSION 1 INVITED PAPERS ON INTELLIGENT ROBOTICS

8301 02 Software-based neural network assisted movement compensation for nanoresolution piezo actuators (Invited Paper) [8301-01]
M. Kauppinen, J. Röning, Univ. of Oulu (Finland)

8301 03 Traffic monitoring with distributed smart cameras (Invited Paper) [8301-02]
O. Sidla, M. Rosner, SLR Engineering OG (Austria); M. Ulm, Austrian Institute of Technology (Austria); G. Schwingshackl, SensoTech GmbH (Austria)

8301 04 The 19th Annual Intelligent Ground Vehicle Competition: student built autonomous ground vehicles (Invited Paper) [8301-03]
B. L. Theisen, U.S. Army Tank Automotive Research, Development and Engineering Ctr. (United States)

SESSION 2 STEREO VISION AND APPLICATIONS

8301 05 Accurate dense 3D reconstruction of moving and still objects from dynamic stereo sequences based on temporal modified-RANSAC and feature-cut [8301-04]
N. Tatematsu, J. Ohya, Waseda Univ. (Japan)

8301 06 Efficient hybrid monocular-stereo approach to on-board video-based traffic sign detection and tracking [8301-05]
J. Marinas, L. Salgado, J. Arróspide, M. Camplani, Univ. Politécnica de Madrid (Spain)

8301 07 A general model and calibration method for spherical stereoscopic vision [8301-06]
W. Feng, Tianjin Univ. (China); J. Röning, J. Kannala, Univ. of Oulu (Finland); X. Zong, B. Zhang, Tianjin Univ. (China)

8301 08 An approach to stereo-point cloud registration using image homographies [8301-07]
S. D. Fox, D. M. Lyons, Fordham Univ. (United States)

8301 09 Hazardous sign detection for safety applications in traffic monitoring [8301-08]
W. Benesova, M. Kottman, Slovak Univ. of Technology (Slovakia); O. Sidla, SLR Engineering OG (Austria)

8301 0A PROViScout: a planetary scouting rover demonstrator [8301-09]
G. Paar, JOANNEUM RESEARCH (Austria); M. Woods, SciSys Ltd. (United Kingdom); C. Gimkiewicz, CSEM Zurich Ctr. (Switzerland); F. Labrosse, Aberystwyth Univ. (United Kingdom); A. Medina, GMV S.A. (Spain); L. Tyler, D. P. Barnes, Aberystwyth Univ. (United Kingdom); G. Fritz, JOANNEUM RESEARCH (Austria); K. Kapellos, Trasys (Belgium)
SESSION 3  NOVEL PEOPLE AND VEHICLE TRACKING APPROACHES

8301 0B  Red-light traffic enforcement at railway crossings [8301-10]
O. Sidla, G. Loibner, SLR Engineering OG (Austria)

8301 0C  Image projection clues for improved real-time vehicle tracking in tunnels [8301-11]
V. Jelača, J. O. Niño-Castañeda, A. Pižurica, W. Philips, Univ. Gent (Belgium)

8301 0D  Decentralized tracking of humans using a camera network [8301-12]
S. Gruenwedel, V. Jelača, J. O. Niño-Castañeda, P. Van Hese, D. Van Cauwelaert,
P. Veelaert, W. Philips, Univ. Gent (Belgium)

8301 0E  Real-time detection of traffic events using smart cameras [8301-13]
M. Macesic, Tehnomobil-Protech Ltd. (Serbia); V. Jelaca, J. O. Niño-Castaneda, Univ. Gent
(Belgium); N. Prodanovic, M. Panic, Univ. of Novi Sad (Serbia); A. Pizurica, Univ. Gent
(Belgium); V. Crnojevic, Univ. of Novi Sad (Serbia); W. Philips, Univ. Gent (Belgium)

8301 0F  Vehicle tracking data for calibrating microscopic traffic simulation models [8301-14]
M. Schönauer, mobimera Fairkehrstechnologien (Austria); Y. Lipetski, SLR Engineering OG
(Austria); H. Schrom-Feiertag, Austrian Institute of Technology (Austria)

SESSION 4  UAVS AND AERIAL APPLICATIONS

8301 0G  AR.Drone: security threat analysis and exemplary attack to track persons [8301-15]
F. Samland, J. Fruth, M. Hildebrandt, T. Hoppe, J. Dittmann, Otto-von-Guericke-Univ. of
Magdeburg (Germany)

8301 0H  Detection of unknown targets from aerial camera and extraction of simple object
fingerprints for the purpose of target reacquisition [8301-16]
T. N. Mundhenk, K.-Y. Ni, Y. Chen, K. Kim, Y. Owechko, HRL Labs., LLC (United States)

8301 0J  Super-resolution terrain map enhancement for navigation based on satellite imagery
[8301-18]
J. Straub, The Univ. of North Dakota (United States)

SESSION 5  ROBOT MANIPULATION AND APPLICATION

8301 0K  3D positional control of magnetic levitation system using adaptive control: improvement of
positioning control in horizontal plane [8301-19]
T. Nishino, Toshiba Industrial Products Manufacturing Corp. (Japan); Y. Fujitani, N. Kato, Mie
Univ. (Japan); N. Tsuda, Wakayama National College of Technology (Japan); Y. Nomura,
H. Matsui, Mie Univ. (Japan)

8301 0M  The magic glove: a gesture-based remote controller for intelligent mobile robots [8301-21]
C. Luo, Y. Chen, M. Krishnan, M. Paulik, Univ. of Detroit Mercy (United States)

8301 0N  Way-point navigation for a skid-steer vehicle in unknown environments [8301-22]
P. Chen, A. Das, P. Mukherjee, S. Waslander, Univ. of Waterloo (Canada)
SESSION 6  VISION NAVIGATION AND ACTIVITY RECOGNITION

8301 00 Integrated field testing of planetary robotics vision processing: the PRoVisG campaign in Tenerife 2011 [8301-23]
G. Paar, JOANNEUM RESEARCH (Austria); L. Waugh, EADS Astrium Ltd. (United Kingdom); D. P. Barnes, Aberystwyth Univ. (United Kingdom); T. Pajdla, Czech Technical Univ. in Prague (Czech Republic); M. Woods, SciSys Ltd. (United Kingdom); H.-R. Graf, CSEM Zurich Ctr. (Switzerland); Y. Gao, Surrey Space Ctr. (United Kingdom); K. Willner, Technical Univ. of Berlin (Germany); J.-P. Muller, Univ. College London (United Kingdom); R. Li, The Ohio State Univ. (United States)

8301 0P Hierarchical loop detection for mobile outdoor robots [8301-24]
D. Lang, C. Winkens, M. Häselich, D. Paulus, Univ. Koblenz-Landau (Germany)

8301 0Q A novel margin-based linear embedding technique for visual object recognition [8301-25]
F. Dornaika, Univ. of the Basque Country (Spain) and Basque Foundation for Science (Spain); A. Assoum, Lebanese Univ. (Lebanon)

8301 0R Real-time two-level foreground detection and person-silhouette extraction enhanced by body-parts tracking [8301-26]
R. Deeb, E. Desserée, S. Bouakaz, LIris, CNRS, Univ. Claude Bernard Lyon 1 (France)

8301 0S Activity recognition from video using layered approach [8301-27]
C. A. McPherson, J. M. Irvine, M. Young, Draper Lab. (United States); A. Stefanidis, George Mason Univ. (United States)

SESSION 7  VISUAL ALGORITHMS

8301 0T Method for fast detecting the intersection of a plane and a cube in an octree structure to find point sets within a convex region [8301-28]
K. Fujimoto, N. Kimura, T. Moriya, Hitachi, Ltd. (Japan)

8301 0V Lucas-Kanade image registration using camera parameters [8301-30]
S. Cho, H. Cho, POSTECH (Korea, Republic of); Y.-W. Tai, KAIST (Korea, Republic of); Y. S. Moon, J. Cho, S. Lee, Samsung Electronics (Korea, Republic of); S. Lee, POSTECH (Korea, Republic of)

8301 0W Object tracking with adaptive HOG detector and adaptive Rao-Blackwellised particle filter [8301-31]
S. Rosa, M. Paleari, P. Ariano, Italian Institute of Technology (Italy); B. Bona, Politecnico di Torino (Italy)

8301 0X A modular real-time vision system for humanoid robots [8301-32]
A. Trifan, A. J. R. Neves, N. Lau, B. Cunha, Univ. de Aveiro (Portugal)
SESSION 8  INTELLIGENT GROUND VEHICLE COMPETITION

8301 0Y Radial polar histogram: obstacle avoidance and path planning for robotic cognition and motion control [8301-33]
P.-J. Wang, N. R. Keyawa, C. Euler, California State Univ., Northridge (United States)

8301 0Z Optimizing a mobile robot control system using GPU acceleration [8301-34]
N. Tuck, M. McGuinness, F. Martin, Univ. of Massachusetts Lowell (United States)

8301 10 Design and realization of an intelligent ground vehicle with modular payloads [8301-35]

8301 11 Navigating a path delineated by colored flags: an approach for a 2011 IGVC requirement [8301-36]
A. Szmatula, M. Parrish, M. Krishnan, M. Paulik, U. Mohammad, C. Luo, Univ. of Detroit Mercy (United States)

8301 12 Navigating with VFH: a strategy to avoid traps [8301-37]
C. Luo, M. Krishnan, M. Paulik, U. Mohammad, Q. Wang, Univ. of Detroit Mercy (United States)

SESSION 9  INTERACTIVE PAPER SESSION

8301 13 Measurement of noises and modulation transfer function of cameras used in optical-digital correlators [8301-38]
N. N. Evtikhiev, S. N. Starikov, P. A. Cheryomkhin, V. V. Krasnov, National Research Nuclear Univ. MEPhI (Russian Federation)

8301 14 A phase space approach for detection and removal of rain in video [8301-39]
V. Santhaseelan, V. K. Asari, Univ. of Dayton (United States)

8301 15 Intelligence algorithms for autonomous navigation in a ground vehicle [8301-40]
S. Petkovsek, R. Shakya, Y. H. Shin, P. Gautam, A. Norton, D. J. Ahlgren, Trinity College (United States)

8301 16 Hierarchical multi-level image mosaicing for autonomous navigation of UAV [8301-41]
S. Park, D. Ghosh, N. Kaabouch, R. A. Fevig, W. Sernke, The Univ. of North Dakota (United States)

8301 17 A fluidic lens with reduced optical aberration [8301-42]
J.-Y. Yiu, R. Batchko, S. Robinson, A. Szilagyi, Holochip Corp. (United States)

Author Index
Conference Committee

Symposium Chairs

Majid Rabbani, Eastman Kodak Company (United States)
Gaurav Sharma, University of Rochester (United States)

Conference Chairs

Juha Röning, University of Oulu (Finland)
David P. Casasent, Carnegie Mellon University (United States)

Program Committee

Norbert Lauinger, CORRsys 3D Sensors AG (Germany)
Dah Jye Lee, Brigham Young University (United States)
Charles A. McPherson, Draper Laboratory (United States)
Kurt S. Niel, Fachhochschule Wels (Austria)
Yoshihiko Nomura, Mie University (Japan)
Daniel Raviv, Florida Atlantic University (United States)
Oliver Sidla, SLR Engineering OG (Austria)
Bernard L. Theisen, U.S. Army Tank Automotive Research, Development and Engineering Center (United States)
Dili Zhang, Monotype Imaging (United States)

Session Chairs

1 Invited Papers on Intelligent Robotics
   Juha Röning, University of Oulu (Finland)

2 Stereo Vision and Applications
   Juha Röning, University of Oulu (Finland)

3 Novel People and Vehicle Tracking Approaches
   Oliver Sidla, SLR Engineering OG (Austria)

4 UAVs and Aerial Applications
   T. Nathan Mundhenk, HRL Laboratories, LLC (United States)

5 Robot Manipulation and Application
   David P. Casasent, Carnegie Mellon University (United States)

6 Vision Navigation and Activity Recognition
   Charles A. McPherson, Draper Laboratory (United States)
7 Visual Algorithms
David P. Casasent, Carnegie Mellon University (United States)
Oliver Sidla, SLR Engineering OG (Austria)

8 Intelligent Ground Vehicle Competition
Bernard L. Theisen, U.S. Army Tank Automotive Research, Development and Engineering Center (United States)