

Lecture Notes in Computer Science
Edited by G. Goos, J. Hartmanis and J. van Leeuwen

1998

Springer

Berlin

Heidelberg

New York

Barcelona

Hong Kong

London

Milan

Paris

Singapore

Tokyo

Reinhard Klette Shmuel Peleg
Gerald Sommer (Eds.)

Robot Vision

International Workshop RobVis 2001
Auckland, New Zealand, February 16-18, 2001
Proceedings



Springer

Series Editors

Gerhard Goos, Karlsruhe University, Germany
Juris Hartmanis, Cornell University, NY, USA
Jan van Leeuwen, Utrecht University, The Netherlands

Volume Editors

Reinhard Klette
The University of Auckland
Center for Image Technology and Robotics (CITR Tamaki)
Tamaki Campus, Building 731
1005 Auckland, New Zealand
E-mail: r.klette@auckland.ac.nz

Shmuel Peleg
The Hebrew University of Jerusalem, Department of Computer Science
Givat Ram, Ross Building
91904 Jerusalem, Israel
E-mail: peleg@cs.huji.ac.il

Gerald Sommer
Universität Kiel, Institut für Informatik
Preusserstr. 1-9, 24105 Kiel, Germany
E-mail: gs@ks.informatik.uni-kiel.de

Cataloging-in-Publication Data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

International Workshop RobVis <2001, Auckland>:
Robot vision : proceedings / International Workshop RobVis 2001,
Auckland, New Zealand, February 16 - 18, 2001. Reinhard Klette . . .
(ed.). - Berlin ; Heidelberg ; New York ; Barcelona ; Hong Kong ;
London ; Milan ; Paris ; Singapore ; Tokyo : Springer, 2001
(Lecture notes in computer science ; Vol. 1998)
ISBN 3-540-41694-3

CR Subject Classification (1998): I.4, I.2.9, I.5

ISSN 0302-9743

ISBN 3-540-41694-3 Springer-Verlag Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer-Verlag. Violations are liable for prosecution under the German Copyright Law.

Springer-Verlag Berlin Heidelberg New York
a member of BertelsmannSpringer Science+Business Media GmbH
© Springer-Verlag Berlin Heidelberg 2001
Printed in Germany

Typesetting: Camera-ready by author, data conversion by DA-TeX Gerd Blumenstein
Printed on acid-free paper SPIN 10782191 06/3142 5 4 3 2 1 0

Preface

On behalf of the organizers we would like to welcome all participants to the “Robot Vision 2001” workshop. Our objective has been to bring together researchers in robot vision, and to promote interaction and debate. Participants of the workshop come from Europe, US, the Middle East, the Far East, and of course from New Zealand.

Fifty-two papers were submitted to the workshop, and each paper was thoroughly reviewed by at least three reviewers. Seventeen papers were selected for oral presentation, and seventeen papers were selected for poster presentation. There were no invited technical papers, to give all participants the sense of equal opportunity.

The technical scope of the workshop is very wide, and includes presentations on motion analysis, 3D measurements, calibration, navigation, object recognition, and more. The schedule of the workshop was therefore prepared to allow, in addition to the technical presentation, ample time for discussions and interaction. We hope that interaction among researchers of such different areas, yet all part of robot vision, will result in better understanding and research of the robot vision area.

February 2001

Reinhard Klette, Shmuel Peleg, and Gerald Sommer

Organization

RobVis 2001 was organized by the Center for Image Technology and Robotics (CITR), Tamaki campus, The University of Auckland.

Co-chairs

Reinhard Klette (Auckland, New Zealand)
Shmuel Peleg (Jerusalem, Israel)
Gerald Sommer (Kiel, Germany)

Program Committee

Jacky Baltes (Auckland, NZ), Thomas Bräunl (Nedlands, AUS), Ross Clarke (Hamilton, NZ), Georgy Gimel'farb (Auckland, NZ), Atsushi Imiya (Chiba, J), Reinhard Klette (Auckland, NZ), Claus-E. Liedtke (Hanover, D), Bruce MacDonald (Auckland, NZ), Takashi Matsuyama (Kyoto, Japan), Allan McIvor (Auckland, NZ), Josef Pauli (Kiel, D), Shmuel Peleg (Jerusalem, IL), Moshe Porat (Haifa, IL), Gerald Sommer (Kiel, D), Bill Trigs (Grenoble, F), and Friedrich Wahl (Braunschweig, D).

Local Organizing Committee

Jacky Baltes, Georgy Gimel'farb, Ulrich Günther, James Harper, Reinhard Klette, Cecilia Lourdes, Bruce MacDonald, S. Manoharan, Sudhir Reddy, and Sharon Walker.

Sponsors

The International Association for Pattern Recognition
MORST/DFG
Institute of Electrical and Electronic Engineers (IEEE) - NZ North Section
The University of Auckland, Tamaki campus
Visual Impact Auckland Ltd.

Table of Contents

Active Perception

Visual Cues for a Fixating Active Agent	1
<i>Mårten Björkman and Jan-Olof Eklundh</i>	
Tracking with a Novel Pose Estimation Algorithm	9
<i>Bodo Rosenhahn, Norbert Krüger, Torge Rabsch and Gerald Sommer</i>	
Real-Time Tracking of Articulated Human Models Using a 3D Shape-from-Silhouette Method	19
<i>Jason Luck, Dan Small and Charles Q. Little</i>	
Hierarchical 3D Pose Estimation for Articulated Human Body Models from a Sequence of Volume Data	27
<i>Sebastian Weik and C.-E. Liedtke</i>	
Vision-Based Robot Localization Using Sporadic Features	35
<i>Stefan Enderle, Heiko Folkerts, Marcus Ritter, Stefan Sablatnög, Gerhard Kraetzschmar and Günther Palm</i>	

Poster Session 1: Computer Vision

A Comparison of Feature Measurements for Kinetic Studies on Human Bodies	43
<i>Nikki Austin, Yen Chen, Reinhard Klette, Robert Marshall, Yuan-sheng Tsai and Yongbao Zhang</i>	
Object Identification and Pose Estimation for Automatic Manipulation	52
<i>Benjamin Hohnhaeuser and Guenter Hommel</i>	
Toward Self-calibration of a Stereo Rig from Noisy Stereoscopic Images	60
<i>Slimane Larabi</i>	
A Color Segmentation Algorithm for Real-Time Object Localization on Small Embedded Systems	69
<i>Philippe Leclercq and Thomas Bräunl</i>	
EYESCAN – A High Resolution Digital Panoramic Camera	77
<i>Karsten Scheibe, Hartmut Korsitzky, Ralf Reulke, Martin Scheele and Michael Solbrig</i>	
A Wavelet-Based Algorithm for Height from Gradients	84
<i>Tiangong Wei and Reinhard Klette</i>	
Enhanced Stereo Vision Using Free-Form Surface Mirrors	91
<i>Alexander Wuerz, Stefan K. Gehrig and Fridtjof J. Stein</i>	

Poster Session 2: Robotics & Video

RoboCup-99: A Student's Perspective	99
<i>Jacky Baltes</i>	
HORUS: Object Orientation and Id without Additional Markers	107
<i>Jacky Baltes</i>	
An Stereoscopic Vision System Guiding an Autonomous Helicopter for Overhead Power Cable Inspection	115
<i>Pascual Campoy, Pedro J. Garcia, Antonio Barrientos, Jaime del Cerro, Iñiqui Aguirre, Andrés Roa, Rafael Garcia and José M. Muñoz</i>	
3D Stereo Vision-Based Nursing Robot for Elderly Health Care	125
<i>Wee-Soon Ching, Edward Ho, Christopher Ong, Hs Tay and Sai-Mui Lim</i>	
Efficient Computation of Intensity Profiles for Real-Time Vision	131
<i>Ernst Dieter Dickmanns</i>	
Subpixel Flow Detection by the Hough Transform	140
<i>Atsushi Imiya and Keisuke Iwawaki</i>	
Tracking of Moving Heads in Cluttered Scenes from Stereo Vision	148
<i>Ruijiang Luo and Yan Guo</i>	
Servoing Mechanisms for Peg-In-Hole Assembly Operations	157
<i>Josef Pauli, Arne Schmidt and Gerald Sommer</i>	
Robot Localization Using Omnidirectional Color Images	167
<i>David C. K. Yuen and Bruce A. MacDonald</i>	
The Background Subtraction Problem for Video Surveillance Systems	176
<i>Alan McIvor, Qi Zang and Reinhard Klette</i>	

Computational Stereo

Stable Monotonic Matching for Stereoscopic Vision	184
<i>Radim Šára</i>	
Random Sampling and Voting Method for Three-Dimensional Reconstruction	193
<i>Kazuhiko Kawamoto and Atsushi Imiya</i>	
Binocular Stereo by Maximizing the Likelihood Ratio Relative to a Random Terrain	201
<i>Georgy Gimel'farb</i>	
Stereo Reconstruction from Polycentric Panoramas	209
<i>Fay Huang, Shou Kang Wei and Reinhard Klette</i>	

Robotic Vision

Two Modules of a Vision-Based Robotic System: Attention and Accumulation of Object Representations	219
<i>Norbert Krüger, Daniel Wendorff and Gerald Sommer</i>	
Compatibilities for the Perception-Action Cycle	227
<i>Josef Pauli and Gerald Sommer</i>	
Trifocal Tensors with Grassmann-Cayley Algebra	237
<i>Hongbo Li</i>	
Camera Calibration Using Rectangular Textures	245
<i>Jacky Baltés</i>	

Image Acquisition

Optical Flow in Log-mapped Image Plane (A New Approach)	252
<i>Mohammed Yeasin</i>	
Hypothetically Modeled Perceptual Sensory Modality of Human Visual Selective Attention Scheme by PFC-Based Network	261
<i>Takamasa Koshizen and Hiroshi Tsujino</i>	
Results of Test Flights with the Airborne Digital Sensor ADS40	270
<i>Anko Börner and Ralf Reulke</i>	
Localized Video Compression for Machine Vision	278
<i>Moshe Porat</i>	

Author Index	285
---------------------------	-----