Second International Conference on 3-D Digital Imaging and Modeling

PRELIMINARY PROGRAM AND REGISTRATION BULLETIN

Château Laurier Hotel
Ottawa, Ontario Canada
October 4 – 8, 1999

Sponsored by:

National Research Council Canada

Conference Secretariat

Pierre Lamoureux, Conference Manager
Second International Conference on 3-D Digital Imaging and Modeling
National Research Council Canada
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Important Dates
Early registration deadline – September 1, 1999
Hotel accommodation deadline – August 20, 1999

Organization

ORGANIZING COMMITTEE
Chair - Marc Rioux, National Research Council Canada
Program Co-Chairs – Pierre Boulanger, National Research Council Canada
Denis Laurendeau, Université Laval

Committee Members
Jean-Angelo Beraldin
Luc Cournoyer
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Guy Godin
David Green
Patrick Hébert
Eric Paquet
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Conference Manager -
Pierre Lamoureux, National Research Council Canada

This conference is organized by the National Research Council of Canada in co-operation with the International Association for Pattern Recognition (IAPR).

PROGRAM COMMITTEE

- Heikki Ailisto, VTT Electronics (Finland)
- Ruzena Bajcsy, University of Pennsylvania (USA)
- Paul Besl, Alias|Wavefront (USA)
- Angelo Beraldin, National Research Council (Canada)
- Robert Bergevin, Laval University (Canada)
- François Blais, Vitana Corporation (Canada)
- Kevin Bowyer, University of South Florida (USA)
- Paul Cohen, École Polytechnique de Montréal (Canada)
- Sabry El-Hakim, National Research Council (Canada)
- Robert Fisher, University of Edinburgh (UK)
- Patrick Flynn, Washington State University (USA)
- Dieter Fritsch, University of Stuttgart (Germany)
- Denis Gingras, National Optics Institute (Canada)
- Guy Godin, National Research Council (Canada)
- Michael Greenspan, National Research Council (Canada)
- Henrik Haggren, Helsinki University of Technology (Finland)
- Patrick Hébert, National Research Council (Canada)
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- Anil Jain, Michigan State University (USA)
- Peter Jones, Loughborough University (UK)
- Takeo Kanade, Carnegie Mellon University (USA)
- Takeshi Masuda, Electro Technical Laboratory (Japan)
- Eric Paquet, National Research Council (Canada)
- Gerhard Roth, National Research Council (Canada)
- Francis Schmitt, École nationale supérieure des télécommunications (France)
- Linda Shapiro, University of Washington (USA)
- Yoshiaki Shirai, Osaka University (Japan)
- Demetri Terzopoulos, University of Toronto (Canada)
- Michael Vannier, University of Iowa (USA)
- Kazuhiko Yamamoto, Gifu University (Japan)
- Naokazu Yokoya, Nara Institute of Science and Technology (Japan)

Introduction

We invite you to join us this October in Ottawa, the capital of Canada, for the Second International Conference on 3D Digital Imaging and Modeling. This conference, organized by the National Research Council of Canada (NRC), is intended to cover a wide spectrum of activities in the emerging science of 3D digital imaging and modeling. It will provide an international forum for scientists and engineers to present and discuss recent advances in the field. Attendees will receive both a broad overview of key technologies and a glimpse into state-of-the-art developments that are currently occurring all over the world. Short courses will also provide opportunities for those entering the field or wishing to broaden their knowledge.

The conference will take place again at the Château Laurier Hotel, one of the finest hotels in Canada, which is located at the very centre of the city, adjacent to the Rideau Canal and within walking distance of a variety of cafés, restaurants, shops, museums, galleries, and Ottawa's Byward Market. At this time of the year, the temperatures range from about 20° C (70° F) during the day to 12° C (54° F) at night. October is a busy month for visitors to Ottawa, so book early to be sure to obtain a room at the Château.

The conference begins on Monday morning with tutorial classes and ends Friday afternoon with a lab visit to the NRC facilities. Approximately 60 papers from sixteen countries have been accepted for presentation in a single track format. Half of the papers presented will cover the collection and the preprocessing of 3D data, the other half of the papers will focus on modeling (objects, environment and the human body). There will be three and a half days of presentations starting on Tuesday morning and ending on Friday at noon. Four invited speakers with vast experience in the field will share their views on the collection of 3D data, recent modeling techniques and emerging application opportunities in the field.

To complement the conference, on Monday there will be four half day short courses organized in two parallel tracks. In the morning there will be a session on the design of optical digitizing for 3D image capture in parallel with a session on geometric processing of 3D data. In the afternoon, there will be two parallel sessions on modeling, one related to CAD for industrial applications and the other related to the human body for anthropometry and medical applications. On Friday afternoon, attendees will have the opportunity to visit the NRC Visual Information Technology labs to attend demonstrations related to latest research activities in 3D color digitizing, modeling and display.

To provide you with more opportunities to meet and get to know your colleagues, we have planned a welcoming reception on Tuesday evening at the Château Laurier and a dinner on Wednesday night at the National Gallery of Canada.

Whether you are interested in learning about 3D digitizing, 3D modeling and the various applications emerging from this field of imaging, or in meeting the leading experts of this developing technology, this is the conference to attend. We look forward to seeing you.

Marc Rioux, Conference Chair
Pierre Boulanger and Denis Laurendeau, Scientific Program Co-Chairs

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Thursday, October 7			
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Friday, October 8			
8:30-9:10	Kathleen M. Robinette		
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10:55-12:30	Plenary Session		
13:00-16:00		Visit of NRC VIT Group	
Oct.5-7, 1999	EXHIBIT		

Each speaker has 20 minutes for the oral session and 5 minutes for questions.

PROGRAM

Monday, October 4

07:30 - 18:00 Registration

09:00 - 12:00 Tutorial Sessions

Session #1 Active 3D Sensing
J. Angelo Beraldin and François Blais, National Research Council Canada

This tutorial provides an introduction to some of the most popular active 3D sensing techniques found in the literature and in commercial products. Although the emphasis of the course is focused on active triangulation and imaging time of flight systems, other techniques such as optical interferometry and passive methods are briefly discussed.

For each group of 3D method, optical, hardware, and algorithmic related topics as well as case studies are discussed. Basic knowledge of 3D measurement principle, Gaussian beam propagation and optical signal detection with solid-state detectors is provided so that critical aspects like image resolution and range image precision can be evaluated. Furthermore, algorithms related to signal extraction, control of scanning mechanisms, calibration, and some specific case studies are presented.

Benefits
The aim of this tutorial is to provide the attendees with tools to evaluate and better understand active 3D sensing techniques in their own applications. Those applications may include building or purchasing a 3D system and understanding the nature of the 3D images in order to apply optimal geometric processing algorithms. This tutorial should help the attendee in modeling a given sensor into a “black box”, and in understanding some image artifact that can be encountered. The case studies will expose the attendee to have a feel of some of the most interesting applications of active 3D sensing.

Intended audience
People who are involved in the development, evaluation and application of 3D sensing techniques in an industrial or educational context.

J.Angelo Beraldin joined the Institute for Information Technology at the National Research Council Canada in 1986. His current research interests include sensor systems engineering and analog and digital signal processing for 3-D vision systems. He has more than 40 papers and publications, 1 patent, and, has licensed technology to 3 Canadian companies. He is also a registered professional engineer with the province of Ontario.

François Blais joined the National Research Council Canada in 1984 where he has been involved in the development of the different 3D range sensor technologies at NRC. His topics of interest cover various fields in digital signal and image processing, control, 3D vision systems and their applications. He has more than 60 papers and publications, and 8 patents of which 7 have been licensed to different Canadian industries. Mr. Blais is a registered professional engineer of Ontario.

Session #2 CAD/CAM Applications of 3D Optical Scanners
Paul Besl, Alias/Wavefront, Inc., USA

When 3D scanners are “accurate” to within ±0.1 mm, the digitized data points are directly useful in numerous CAD/CAM applications. However, many CAD/CAM applications are still not ready to receive this type of data owing to the amount of data, the “noise” issues, the occasional outliers, merging data sets, and other idiosyncrasies. This tutorial will discuss the “real-world” issues that occur when applying advanced scanner technology to design/modeling, inspection/verification, and part replication applications in today’s existing CAD/CAM environments.

Benefits
If you are considering 3d optical scanning technology for your CAD/CAM applications, this tutorial will provide you with information on what to expect in the way of the difficulties and the benefits of the technology compared to existing alternatives.

Intended audience
The presentation will not assume a background in any particular area, but some familiarity with CAD/CAM and coordinate measurement would be helpful as well as a technical background in engineering or the physical or computing sciences.

Dr. Paul Besl has been working in this field since 1981. He is currently with Alias|Wavefront, Inc. and has prior experience with General Motors and SDRC. He received his Ph.D. from the University of Michigan, Ann Arbor, in 1986. During the last ten years, he has focused on various geometric problems in manufacturing, with a continuing involvement in the implementation of 3d optical measurement applications.

12:00 - 13:30 Lunch

13:30 - 17:30 Tutorial Sessions

Session #3 Knowledge Representation in Range Image Analysis
Pierre Boulanger, National Research Council Canada

The purpose is to present state-of-the-art techniques on processing range images in a coherent knowledge representation context and how to use this information to solve practical problems. The different methods used for representing surfaces and curves and how one can reliably infer them from real range images using a Baysian framework will be reviewed. From these estimated geometrical primitives, a description on how one can represent the relationships between them using various techniques and how these methods can be used will be provided. Dr. Boulanger will also demonstrate that as in complex mechanical problems in physics where a well-adapted coordinate system can significantly simplify a problem, a good knowledge representation method can also simplify the complexity of higher level processing.

A description of how one can represent high level knowledge in a manner compatible with lower level will be addressed. He will describe how some procedural systems calling low level or intermediate level routines can interrogate and reason about the low level knowledge. Emphasis will be placed on the importance of maximum likelihood reasoning to produce a system capable of dealing with real-world situations such as false knowledge and missing information. He will also focus on feedback expectancy methods to stabilize the analysis process.

During this tutorial, experimental results and an analysis of the pros and cons of each method will be presented.

Benefits
This course will enable the attendee to grasp the basic concepts allowing the extraction of geometric primitives from 3-D data.

Intended audience
This tutorial is primarily intended for practitioners of computer vision who are interested in state-of-the-art range image processing and understanding. The tutorial requires some basic knowledge of computer vision, differential geometry, and statistics, but these are not prerequisite.

Dr. Pierre Boulanger has been a research officer at the National Research Council of Canada for 12 years, specializing in the field of range image processing, geometrical modeling, and non-linear optimization. He has published more than 45 papers, in journals and for conferences, on various topics relating to range image processing and its applications. Dr. Boulanger has a Ph.D. from the University of Montreal in Electrical Engineering.

Session #4 Digitizing and Modeling the Human Body
Michael Vannier, Iowa State University, USA

This tutorial will cover the various modalities for data collection in body surface anthropometry and medicine. Specific advantages and limitations of current 3D surface digitizing technology will be delineated and demonstrated.

Visualisation, modeling and analysis software tools available will be discussed in the context of medical applications such as orthotics, prosthetics, dentistry and orthopedics. Deformable models applied to anatomic atlases, the current status of the Visible Human project (a public domain database of high resolution, 2Kx2K, 24 bit color cryosections taken at submillimeter intervals plus CT and MRI scans), and the replication of life size anatomic models for surgical planning will also be presented.

Benefits
This tutorial will offer you a broad review of the technologies involved in noncontact 3D surface digitization of the human body for anthropometry and medical applications. The information presented provides a fundamental understanding of what tools are needed to do the job, allows you to know what is currently available (avoid pitfalls and appreciate current limitations), and to be conversant with major trends and new developments in this rapidly evolving field.

Intended audience
This tutorial is intended for researchers and engineers involve in the development of new applications in medicine and body surface anthropometry. A background in the biomedical sciences, bioengineering or ergonomics would be helpful as well as basic knowledge in computer vision.

Dr. Michael W. Vannier is presently professor and chairman of the department of radiology at the University of Iowa. He graduated from the University of Kentucky School of Medicine and completed a diagnostic radiology residency at the Mallinckrodt Institute of Radiology at Washington University in St. Louis, Missouri. He has worked extensively on methods and applications of 3D biomedical visualization and analysis in craniofacial deformities and lower limb prosthetics.
Dr. Vannier serves as editor-in-chief of the IEEE Transactions on Medical Imaging.

18:00 - 22:00 Exhibition set - up

Tuesday, October 5

07:30 - 17:30	Registration
08:15 - 08:30	Conference opens - Welcoming Remarks
08:30 - 09:10	The Digital Michelangelo Project Marc Levoy, *Stanford, CA, USA*, (Invited Speaker)
	Session #1 – 3D Sensors
09:10 - 09:35	Hand - held acquisition of 3D models with a video camera Marc Pollefeys, Reinhard Koch, Maarten Vergauwen, and Luc Van Gool, K.U.Leuven, *Belgium*
09:35 - 10:00	A Low - Cost Range Finder using a Visually Located, Structured Light Source R. B. Fisher, A. P. Ashbrook, C. Robertson, and N. Werghi, *Division of Informatics, Edinburgh University, U.K.*
10:00 - 10:25	Digital 3-D Imaging System for Rapid Response on Remote Sites J - A Beraldin, F. Blais, L. Cournoyer, M. Rioux, S.H. El - Hakim , *Visual Information Technology Group, National Research Council, Canada*
10:00 - 17:00	Exhibition
10:25 - 10:55	Coffee Break
	Session #2 – 3D Sensors
10:55 - 11:20	Advances in the Cooperation of Shape from Shading and Stereo Vision Holger Lange, *Computing Devices, Canada*
11:20 - 11:45	Moving Objects Detection from Time - Varied Background: An Application of Camera 3D Motion Analysis, Zhencheng Hu and Keiichi Uchimura, *Computer Science Department, Kumamoto University, Japan*
11:45 - 13:20	Lunch
	Session #3 – 3D Sensors
13:20 - 13:45	Locking onto 3D - Structure by a Combined Vergeance - and Fusion system Rolf D. Henkel, *Institute for Theoretical Neurophysics, University of Bremen, Germany*
13:45 - 14:10	3D Shape Recovery and Registration Based on the Projection of Non Coherent Structured Light Roberto Rodella, and Giovanna Sansoni, *INFM and Dept. of Electronics for the Automation, Italy*
14:10 - 14:35	Curve and Surface Models to drive 3D Reconstruction using Stereo and Shading. David Roussel, Patrick Bourdot, Rachid Gherbi, *LIMSI/CNRS, University of Paris XI , France*
14:35 - 15:05	Coffee Break and Exhibition

Session #4 – 3D Sensors

15:05 - 15:30 Calibration of a Laser Stripe Profiler, Alan M. McIvor, *Industrial Research, Auckland, New Zealand*

15:30 - 15:55 Computing consistent normals and colors from photometric data
Holly Rushmeier and Fausto Bernardini, *IBM T.J. Watson Research Center, USA*

15:55 - 16:20 Bayesian Estimation of Distance and Surface Normal with a Time - of - Flight Laser Range finder
Jochen Lang and Dinesh K. Pai, *Laboratory of Computational Intelligence, Department of Computer Science, University of British Columbia, Canada*

16:20 - 16:45 Model - Based Scanning Path Generation for Inspection
Chang Shu and Fengfeng Xi, *National Research Council of Canada, Canada*

16:45 - 17:20 Poster Presentations (2 min. presentation of each poster)

17:20 - 18:30 Reception + Poster Session

Wednesday, October 6

08:00 - 17:30 Registration

08:30 - 09:10 Denis Poussart, *Laval University, Canada* (Invited Speaker)

Session #5 – View Planning

09:10 - 09:35 CAD - based range sensor placement for optimum 3D data acquisition
F. Prieto , H.T. Redarce, *Laboratoire d'Automatique Industrielle INSA Lyon France*
P. Boulanger, *IIT, NRC, Canada*
R. Lepage, *Laboratore d'Imagerie, de Vision et d'Intelligence Artificielle École de Technologie Supérieure de Montréal, Canada*

09:35 - 10:00 Computations on a Spherical View Space for Efficient Planning of Viewpoints in 3 - D Object Modeling
Ken'ichi Morooka , Hongbin Zha, and Tsutomu Hasegawa, *Kyushu University, Japan*

10:00 - 17:00 Exhibition

10:00 - 10:25 An Automation System for Industrial 3 - D Laser Digitizing,
D.G. Lamb and D.L. Baird, Hymarc Ltd., Canada, M.A. Greenspan, *NRC IIT, Canada*

10:25 - 10:55 Coffee Break and Exhibition

Session #6 – View Registration

10:55 - 11:20 Multiview registration for large data sets
Kari Pulli , *Stanford University, USA*

11:20 - 12:45 Robust Surface Matching for Registration
Elizabeth Guest, *COMIR, Leeds University, UK*
Marta Fidrich, *Jozsef Attila University, Szeged, Hungary*
Steven Kelly, *COMIR, Leeds University, UK*
Elizabeth Berry, *COMIR, Leeds University, UK*

11:45 - 13:20 Lunch

Session #7 – View Registration

13:20 - 13:45 Self - Calibration of a Light Striping System by Matching Multiple 3 - D Profile Maps
Olli Jokinen, *Helsinki University of Technology, Finland*

13:45 - 14:10 An automatic registration algorithm for two overlapping range images
Gerhard Roth, *Visual Information Technology Group, National Research Council of Canada, Canada*

14:10 - 14:35 Fast and Robust Registration of 3D Surfaces Using Low Curvature Patches
Van - Duc Nguyen, *GE Research & Development*
Victor Nzomigni, *CMA Consulting*
Charles V. Stewart, *Rensselaer Polytechnic Institute, USA*

14:35 - 15:05 Experimental Analysis of Harmonic Shape Images
Dongmei Zhang and Martial Hebert ,
The Robotics Institute, Carnegie Mellon University, USA

15:05 - 15:30 Coffee Break and Exhibition

Session #8 – Geometric Signal Processing

15:30 - 15:55 Estimating Pose Through Local Geometry
Gilbert Soucy, Francesco G. Callari, and Frank P. Ferrie, *Centre for Intelligent Machines, Department of Electrical Engineering, McGill University, Canada*

15:55 - 16:20 Efficient and Reliable Template Set Matching for 3D Object Recognition
Michael Greenspan and Pierre Boulanger,
National Research Council of Canada, Canada

16:20 - 16:45 Joined Segmentation of Cortical Surface and Brain Volume in MRI using a Homotopic Deformable Cellular Model
Yann Cointepas, *ENST - CNRS URA 820, France*
Isabelle Bloch, *ENST - CNRS URA 820 , France*
Line Garnero, *LENA - CNRS URA 654, France*

18:30 - 21:00 Dinner - National Gallery of Canada

Thursday, October 7

08:00 - 17:00 Registration

08:30 - 09:10 Recent Development in Close - Range Photogrammetry
Armin Gruen, *ETH, Zurich, Switzerland (Invited Speaker)*

Session #9 – Geometric Signal Processing

09:10 - 09:35 Extraction and tracking of surfaces in range image sequences
Xiaoyi Jiang, *Dept. of Computer Science, Univ. of Bern, Switzerland*
Sacha Hofer, *Dept. of Computer Science, Univ. of Bern, Switzerland*
Thomas Stahs, *DaimlerChrysler AG, Research and Technology Center, Ulm, Germany*

Ingo Ahrns, DaimlerChrysler AG, Research and Technology Center, Ulm, Germany
Horst Bunke, Dept. of Computer Science, Univ. of Bern, Switzerland

09:35 - 10:00 A geometric approach to the segmentation of range images
M.E. Bock, *Dept. of Statistics, Perdue Univ. USA*

10:00 - 10:25 OSCAR: Object Segmentation using Correspondence and Relaxation
Ben Galvin, Brendan McCane, and Kevin Novins,
University of Otago, New Zealand

10:25 - 10:55 Coffee Break and Exhibition

Session #10 – Object Modeling

10:55 - 11:20 Faithful recovering of quadric surfaces from 3D range data
Naoufel Werghi, Robert Fisher, Craig Robertson, and Anthony Ashbrook,
University of Edinburgh, U.K.

11:20 - 11:45 Progressive Multilevel Meshes From Octree Particles
Y. Yemez, F. Schmitt , *Signal and Image Processing Department, ENST - CNRS URA820, Paris - FRANCE*

11:45 - 13:20 Lunch

Session #11 – Object Modeling

13:20 - 13:45 Generating Smooth Surfaces with Bicubic Splines over Triangular Meshes: Toward Automatic Model Building from Unorganized 3D Points
Toshio Ueshiba, *Electrotechnical Laboratory, Japan*
Gerhard Roth, *National Research Council of Canada, Canada*

13:45 - 14:10 Constructing NURBS Surface Model from Scattered and Unorganized Range Data
In Kyu Park, *School of Electrical Engineering, Seoul National Univ. Korea*
Il Dong Yun, *School of Electronics and Control Engineering, Hankuk Univ. of F.S , Korea*
Sang Uk Lee, *School of Electrical Engineering, Seoul National Univ. Korea*

14:10 - 14:35 Dynamic Gaze - Controlled Levels of Detail of Polygonal Objects in 3 - D Environment Modeling
Hongbin Zha, Yoshinobu Makimoto, Tsutomu Hasegawa,
Department of Intelligent Systems, Kyushu University, Japan

14:35 - 15:05 Coffee Break and Exhibition

Session #12 – Environment Modeling

15:05 - 15:30 The Mapping of Texture on VR Polygonal Models
Denis Laurendeau, *Computer Vision and Systems Laboratory*
Department of Electrical Engineering and Computer Engineering, Laval University, Canada
Nathalie Bertrand and Régis Houde, *Robotics Division, Hydro Québec Research Institute, Canada*

15:30 - 15:55 Modeling structured environments by a single moving camera
Repo Tapio, Röning Juha, *Infotech Oulu and Department of Electrical Engineering, University of Oulu, Finland*

15:55 - 16:20 Indoor Scene Reconstruction from Sets of Noisy Range Images
Ross T. Whitaker, *Department of Electrical Engineering, University of Tennessee, USA*
Jens Gregor and Philip F. Chen, *Department of Computer Science, University of Tennessee, USA*

16:20 - 16:45 Large Data Sets and Confusing Scenes in 3 - D surface Matching and Recognition
Owen Carmichael, Daniel Huber, and Martial Hebert,
The Robotics Institute, Carnegie Mellon University, USA

16:45 - 17:10 Edge - based Approach to Mesh Simplification
Kyowoong Choo, *Seoul Nat'l Univ., Seoul, Korea*
Il Dong Yun, *Hankuk Univ. of F. S., Yongin, Korea*
Sang Uk Lee, *Seoul Nat'l Univ., Seoul, Korea*

Friday, October 8

08:00 - 13:00 Registration

08:30 - 09:10 The Caesar Project: A 3D Surface Anthropometry Survey
Kathleen Robinette, *Wright - Patterson Air Force Base, Dayton, USA*
(Invited Speaker)

Session #13 – Human Modeling

09:10 - 09:35 Building Symbolic Information for 3D Human Body Modeling from Range Data
L Dekker, I Douros, BF Buxton, P Treleaven,
Department of Computer Science, University College, London, UK

9:35 - 10:00 Building 3D Facial Models and Detecting Face Pose in 3D Space
LAO Shihong, *OMRON Corporation, Japan*
Yasushi SUMI, *Electrotechnical Laboratory, Japan*
Masato KAWADE, *OMRON Corporation, Japan*
Fumiaki TOMITA, *Electrotechnical Laboratory, Japan*

10:00 - 10:25 Automatic Body Measurement for Mass Customization of Garments
Andrew Certain, *Manifold Graphics, Inc.*
Werner Stuetzle, *Department of Statistics, University of Washington, USA*

10:25 - 10:55 Coffee Break

10:55 - 11:20 Plenary Session on the Future Trends of Range Sensors

11:20 - 11:45 Plenary Session on the Applications of Geometric Sensors

11:45 - 13:20 Lunch

13:20 Bus departure to NRC Labs

14:00 - 16:00 Visit of NRC Visual Information Technology Laboratories

16:00 Bus departure from NRC Labs to Château Laurier Hotel.

LIST OF POSTER PRESENTATIONS

1 **3D statistical shape models for medical image segmentation**
Cristian Lorenz, *Philips Research Hamburg,*
Nils Krahnstöver, *Department of Computer Science and Engineering, Pennsylvania State University, USA*

2 **Hand Posture Estimation From 2D Monocular Image**
Hai-Ying Guan, Chin-Seng Chua, and Yeong-Khing Ho,
Nanyang Technological University, China

3 **On-Line Hand-Eye Calibration**
Nicolas Andreff, Bernard Espiau, and RDA Horaud,
INRIA Rhone-Alpes/GRAVIR-IMAG, France

4 **3D Sensing by Binocular Vision with Point Light Sources**
Toshifumi Tsukiyama, Yasuyo Kita and Kazutada Kosikawa
Intelligent Systems Division, Electrotechnical Lab, Japan

5 **Virtual Environment Modeling by Integrated Optical and Acoustic Sensing**
V. Murino, *Dipartimento Scientifico e Tecnologico, University of Verona, Italy*
A. Fusiello, *R. Giannitrapani, and V. Isaia - Dipartimento di Matematica e Informatica, University of Udine, Italy*

6 **Is Appearance-Based Structure from Motion Viable?**
David E. DiFranco, *Massachusetts Institute of Technology, USA*
Sing Bing Kang, *Compaq Computer Corporation, USA*

7 **On Estimating the Position of Fragments on Rotational Symmetric Pottery**
Robert Sablatnig and Christian Menard, *Vienna University of Technology, Pattern Recognition and Image Processing Group, Austria*

8 **Integration of Multiple Local Surface Models from Sparse Range Data**
Denis Laurendeau, Louis Borgeat, Denis Dion Jr , and Francois Cayouette,
Computer Vision and Systems Lab, Laval University, Canada

9 **Automatic Feature Correspondence for Scene Reconstruction from Multiple Views**
Philip W. Smith, *Department of Electrical Engineering, University of Tennessee*
Mark D. Elstrom, *Harris Corporation, Melbourne, FL, USA*

10 **Shape Hierarchy: a Necessary Concept for 3D Reconstruction of Large Scenes**
Teck Khim Ng and Takeo Kanade, *Carnegie Mellon University, USA*

11 **Density and Accuracy Improvement of Phase-Based Disparity**
M. H. Ouali and D. Ziou,
Dept. of mathematics and computer science. U. of Sherbrooke. Canada
C. Laurgeau, *Centre de Robotique. École des Mines de Paris. France*

Venue and Dates

The Second International Conference on 3-D Digital Imaging and Modeling will be held at the Château Laurier Hotel, 1 Rideau Street, Ottawa, Canada from October 4 – 8, 1999.

Official Languages

The official language of the conference is English. There will not be simultaneous interpretation during the Conference.

Format of the conference

The Scientific Program emphasizes the most recent and exciting developments in 3-D imaging and modeling and will cover all aspects from sensors to processing, along with modeling and applications.

Exhibition

In conjunction with the scientific program, commercial companies have been invited to exhibit their products and technology relevant to this Conference. The commercial exhibit will be located in the Banquet Room of the Château Laurier Hotel and will be open from Tuesday, October 5 from 10:00 to 17:00 hours to Thursday, October 7 from 10:00 to 15:30 hours.

For further information regarding this exhibition, please contact the Conference Secretariat at:
Second International Conference on 3-D Digital Imaging and Modeling
National Research Council Canada
Building M-19, Montreal Road
Ottawa, ON, Canada K1A 0R6

Telephone: (613) 993-9431
Facsimile: (613) 993-7250
E-mail: 3dconf@nrc.ca

Financial Assistance

The conference is organized on a self-supporting basis and no financial assistance will be available. We encourage anyone requiring financial support to seek the necessary funding from an institution/ government, company or organization.

Letter of Invitation

The Conference Secretariat will be pleased to send an official letter of invitation to any individual making such a request. It is understood that such an invitation is intended to help potential attendees raise travel funds or obtain a visa. It is not a commitment on the part of the Conference organizers to provide any financial support.

Social Activities

Welcoming Reception
Tuesday, October 5, 1999
17:20-18:30 hours
Château Laurier Hotel
Dress: Casual

Conference Banquet
Wednesday, October 6, 1999
18:30-21:00 hours
National Gallery of Canada
Dress: Business

Additional tickets may be purchased for guests or accompanying persons at $65.00 per person.
** Access by badge - tickets must be presented.

Registration

To participate in the Conference everyone must complete the enclosed Registration Form and forward the original copy together with their payment made payable to the **Receiver General for Canada (3-D '99)**, in Canadian or US dollars to:

Conference Secretariat
Second International Conference on 3-D Digital Imaging and Modeling
National Research Council Canada
Building M-19, Montreal Road
Ottawa, ON, Canada K1A 0R6

Payment may be made by cheque, money order, bank transfer or credit card (only Visa and MasterCard are accepted). The organizers do not take responsibility for reimbursement of overpayments due to currency rate fluctuations.

Registration Desk
The Registration Desk will be located at the Château Laurier Hotel, 1 Rideau Street, Ottawa, Ontario and will be open:

Monday, October 4	- 07:30 - 18:00 hrs
Tuesday, October 5	- 07:30 - 17:30 hrs
Wednesday, October 6	- 08:00 - 17:30 hrs
Thursday, October 7	- 08:00 - 17:00 hrs
Friday, October 8	- 08:00 - 13:00 hrs

Fees:

BEFORE September 1, 1999

Regular Participant:	$ 650 CAN/$ 464 US
Student:	$ 300 CAN/$ 214 US

AFTER September 1, 1999

Regular Participant:	$ 750 CAN/$ 536 US
Student:	$ 400 CAN/$ 286 US

Official Receipt

An official receipt will be mailed to those who have forwarded their payment and Registration Form. Receipts will not be mailed after September 3, 1999. After this date receipts will be held and given to delegates upon arrival.

Cancellation and Refunds

Participants may withdraw their registration fee and submit this request in writing prior to September 1, 1999. All refunds prior to September 1 will be subject to a $75.00 administration charge.

No refund requests will be accepted after this date.

Badges

Badges must be worn at all times in order to gain access into the scientific sessions, exhibition and all social functions.

Accommodation

A block of rooms has been reserved at the Château Laurier Hotel. The conference rate is $159.00 CAN excluding taxes. (Currently, there is a 7% GST and a 5% Ontario Room Tax). Please complete the Request for Accommodation Form and forward it directly to the Château Laurier Hotel. To guarantee your hotel room, you must provide the hotel with one night's deposit ($159 CAN) which will be credited to your first night's stay.

Availability of rooms and conference rate can only be guaranteed prior to August 20,1999.

Accommodation deadline: August 20,1999.

Conference Secretariat

All correspondence before the Conference should be addressed to:

Conference Secretariat
Second International Conference on 3-D Digital Imaging and Modeling
National Research Council Canada
Building M-19, Montreal Road
Ottawa, ON, Canada K1A 0R6
Telephone: (613) 993-9431
Facsimile: (613) 993-7250
E-mail: 3dconf@nrc.ca

Health Insurance

Visitors are NOT covered by the Canadian Health Insurance Plan. It is, therefore, recommended that participants arrange their own health and accident insurance. This can be done before leaving home through a local travel agent or medical association.

Liability

The Conference fees DO NOT include provisions for the insurance of participants against personal injuries, sickness, theft or property damage. This also applies to any event held during the Conference period. Participants and accompanying persons are advised to arrange for insurance they consider necessary. Neither the Conference Organizing Committee, nor its sponsors or committee members assume any responsibility for loss, injury or damage to persons or belongings, whatever their cause may be.

Passports and Visas

Participants are strongly advised to determine which requirements apply to them with respect to entering Canada. For information please consult your nearest Canadian Embassy, High Commission, Consulate or Customs Agent.

Tourist Information

Those wishing to plan excursions in Canada before or after the Conference can obtain maps, accommodation lists and descriptions of sites of interest from the tourism services of each Canadian province:

Québec:	1-800-363-7777
Ontario:	1-800-668-2746
Newfoundland and Labrador:	1-800-563-6353
British Columbia:	1-800-663-6000
Alberta:	1-800-661-8888
Saskatchewan:	1-800-667-7191
Manitoba:	1-800-665-0040
New Brunswick:	1-800-561-0123
Nova Scotia:	1-800-565-0000
Prince Edward Island:	1-800-463-4734

For sites to see and things to do in Ottawa/Hull such as Museums, Triple A Baseball, Festivals and other attractions this clean and safe city has to offer, please contact the Ottawa Tourism and Convention Authority at 1-800-363-4465 or visit the following web sites:

http://www.ottawa.com
http://www.tourottawa.org

Urgent Messages

During the Conference urgent messages may be left at the hotel where the participant is staying.

Weather and Clothing

Formal dress will not be necessary for any of the social functions of the Conference. During the month of October the weather is pleasant in Ottawa. The average high is 14°C (57°F).