

- restrial mapping, current and planned extraterrestrial mapping activities, and planetary cartographic products
- Development and documentation of new techniques for data acquisition and extraterrestrial mapping
 - Development of GIS applications to support extraterrestrial exploration and science
 - Web-based delivery of extraterrestrial map products and GIS data

- Co-operation with related working groups from ICA, IAU, NASA and ESA

Plans of Commission IV

Working Group IV/6, Landscape Modelling and Visualisation is planning a workshop at The University of Georgia from October 29 – 31, 2001.

ISPRS TECHNICAL COMMISSION V CLOSE-RANGE TECHNIQUES AND MACHINE VISION

Outgoing President
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Report of Outgoing President

The last four years (1996-2000) have witnessed rapid progress in close-range digital photogrammetry. Real-time imaging applications have developed and close range photogrammetry has become a more widely adopted measurement tool in fields such as industrial metrology, machine and robot vision, medical and sports science, archaeology, architecture and construction management. Over this period, Commission V has pursued the goal of becoming a focal point, within both the ISPRS and associated organisations, for the communication of ideas and research progress in interdisciplinary areas where close-range imaging is used for 3-D scene reconstruction and visualisation. These developments have culminated in the Congress where they have been presented and discussed.

Innovations in digital imaging and recording technology over the past four-years have spanned a wide scientific spectrum, which has offered a significant opportunity for Commission V to broaden its focus and become more interdisciplinary in its activities. In particular, recently developed laser scanning technology will contribute greatly to issues such as real-time 3-D data acquisition, modelling and scene reconstruction. However, there are still many research goals related to existing theories and technologies that need to be realised and work on these areas can be expected to continue. Such current topics include real-time image sequence analysis, automated sensor orientation and calibration, automated feature extraction and image matching, modelling, and integration of ground-based vision techniques with aerial/space imagery.

There were many interesting new developments and applications in on-line and off-line multi-image and multi-

sensor system configurations, laser scanning, three line scanner, virtual reality and computer animation. To further the aim of ensuring that Commission V remains closely associated with such new progress in close-range imaging,

Outlook by Incoming President

Traditionally Commission V was the focal point for close-range photogrammetric applications. Unlike other Commissions, Commission V followed a vertical approach developing theories, pursuing research and implementing it all to a wide scientific spectrum of close-range Photogrammetry applications and real-world problems, with close co-operation to the other ISPRS Commissions.

This approach attracted the interest of many researchers, coming from disciplines other than Photogrammetry, thus offering Commission V a significant opportunity to broaden its focus and become more interdisciplinary in its activities. Commission V can serve as a focal point within both ISPRS and associated organisations, for the communication of ideas and research progress in interdisciplinary areas where close-range imaging is used for 3-D scene reconstruction and visualisation.

Further pursuing this goal, we plan to enhance the interdisciplinary nature of Commission V, as close-range imaging applications, has become a more widely adopted measurement tool in fields such as industrial metrology, machine and robot vision, medical and sports science, archaeology, architecture and construction management.

Automation in Vision Metrology Systems and Industrial Applications remain a main issue and involves the further realisation of many research goals related to existing theories and technologies. These include the development of off-line and on-line systems and solutions for metrology and robot visions, and the evaluation of systems' performance in theoretical and practical aspects. Further, the use of new sensors call for new developments in data fusion, automated sensor orientation and calibration, and new algorithmic advances.

Virtual Reality is an active research area with very interesting applications. It attracts the interest of many disciplines, within which close-range Photogrammetry has a distinct role in contributing to creation of geometrically accurate and realistically looking real scene and object modelling. This points at least to three research routes: (a) Development of knowledge-assisted 3-D scene understanding and reconstruction, (b) Integration of computer graphics and VR technology, and (c) Design strategies for multi-sensor data collection and integration for complex scenes and environments.

Medical applications of close-range Photogrammetry are currently characterised by real-time requirements, high geometric accuracy for surgery and anthropometry, monitor and reconstruction of dynamic events like human motion. There is a vast amount of useful applications of such research, and Commission V plans to actively support research and development in this area.

Architecture and Archaeology is another big area of photogrammetric applications. Although the contribution of photogrammetric techniques is widely acknowledged and used, the new generation of architects and archaeologists, becoming more accustomed to digital technology and Information Systems, demand more complex solutions. This calls for further research and development from ISPRS side in areas like innovative technologies and development of new products, development of low-cost and rapid techniques, use of Internet and VR technology, integration of close-range vision techniques and spatial information systems and finally the development of standard procedures and products.

The previous collaboration with the computer animation community for the exchange of knowledge, techniques and applications is reaching to more maturity. Much study and research is still required in the areas of integration of live figures and environment generation tasks into the animation process and procedures, as well as on the interaction of real and virtual objects.

As wireless field computing applications for close-range acquisition and processing earn more ground, a new wide area of research and applications is opening up. New issues like (a) the integration of office-to-field solutions for data collection, remote data access, and mobile management, (b) methodologies and applications of integrating close range and high-resolution air-/space-borne imagery, (c) distributed multimedia geospatial databases incorporating close range imagery are coming up.

Finally, the area of Image Sequence Analysis, needs the co-operation of both Commission V and Commission III in pursuing issues like image sequence analysis, temporal analysis, time-constrained solutions, dynamic analysis and tracking, integration of image data with navigation sensor data and multi-sensor information.

Working Groups of Technical Commission V for 2000-2004

WG V/1 Automation for Vision Metrology Systems and Industrial Applications

Chair: Stuart Robson (UK)

Co-Chair: Thomas Luhmann (Germany)

WG V/1 Terms of Reference

- Development of off-line and on-line systems, digital imaging systems and solutions for metrology and robot vision
- Development of algorithms and procedures for automated sensor orientation and system calibration
- Mathematical models and algorithms for vision metrology with emphasis in automation
- System performance evaluation in theoretical and practical aspects in collaboration with WG III/8
- Sensor fusion and the integration of disparate data types
- Target and feature recognition in multi-image correspondence
- Range image acquisition, localisation and segmentation
- New sensors and areas of application for vision metrology
- Co-operation with CMSC

WG V/2 Scene Modelling and Virtual Reality

Chair: Sabry El-Hakim (Canada)

Co-Chair: George Karras (Greece)

WG V/2 Terms of Reference

- Creation of accurate and realistic looking virtual reality (VR) models from real scenes and objects
- Knowledge-assisted 3-D scene understanding and reconstruction for VR applications
- Integration of computer graphics and VR technology with close-range vision techniques
- Improvement of performance aspects, such as speed and automation, of all procedures of 3-D- scene reconstruction
- Design strategies for multi-sensor data collection and integration for complex scenes and environments
- Identifying new VR applications requiring high precision 3-D models created with photogrammetric techniques
- Increasing the collaboration between ISPRS and computer graphics, computer vision, and computational geometry groups

WG V/3 Medical Image Analysis and Human Motion

Chair: Frank van den Heuvel (The Netherlands)

Co-Chair: Hans-Peter Meinzer (Germany)

WG V/3 Terms of Reference

- Development of real-time medical imaging systems
- Use of photogrammetric and computer vision techniques for data analysis in medical imagery
- Dynamic analysis of human motion

- 3-D medical imaging for anthropometry and expression analysis
- 3-D representation and visualisation and medical VR, including support to tele-medicine
- Fostering co-operation between ISPRS and the communities of medical/biomedical engineering, sports science and human/apparel engineering

WG V/4 Image Analysis and Spatial Information Systems for Applications In Cultural Heritage

Chair: Hirofumi Chikatsu (Japan)

Co-Chair: Gabriele Fangi (Italy)

WG V/4 Terms of Reference

- Development and integration of close-range vision techniques and spatial information systems for recording, 3-D reconstruction, modelling and visualisation of structures and items of Cultural Heritage
- Incorporation of innovative technologies and development of new products
- Development of low-cost and rapid techniques in documentation and monitoring of the cultural heritage
- Development of standard procedures and products in co-operation with related disciplines
- Use of Internet and VR techniques to facilitate promotion of cultural heritage
- Close co-operation with national and international groups (e.g. CIPA), as well as ISPRS WGs VII / 4 and VII / 5

WG V/5 Quick Response and Distributed Computing for Close-range Applications

Chair: Antony Stefanidis (USA)

Co-Chair: Vincent Tao (Canada)

WG V/5 Terms of Reference

- Methodologies and applications of integrating close range and air-/space-borne imagery.
- Integration of office-to-field solutions for data collection, remote data access, and mobile management
- Integration of indoor and outdoor 3-D models in urban and industrial areas
- Distributed multimedia geospatial databases incorporating close range imagery and other types of geospatial information
- Wireless field computing applications for geodata acquisition and processing

WG V/6 Visualisation and Animation

Chair: Armin Gruen (Switzerland)

Co-Chair: Shunji Murai (Japan)

WG V/6 Terms of Reference

- Development of image-based techniques for integration of live figures and environment generation tasks into the animation process and procedures
- Study of methods and techniques to support the interaction of real and virtual objects
- Encouragement of collaboration with the computer animation community for the exchange of knowledge, techniques and applications
- Promotion of application-specific photogrammetric technology through collaboration with related ISPRS Working Groups and through presentations at technical meetings of the animation community

IC WG V/III Image Sequence Analysis

Chair: Marc Pollefeys (Belgium)

Co-Chair: Guoqing Zhou (USA)

IC WG V/III Terms of Reference

- Algorithms and processes in image sequence analysis, temporal analysis, time-constrained solutions and dynamic analysis and tracking
- Integration of image data with navigation sensor data and multi-sensor information
- Devices for image sequence acquisition and storage
- Systems and applications in robot vision, machine vision, medical imaging, autonomous navigation, motion analysis, deformation analysis and data capture for VR

Plans of Commission V

The following conferences are being organised by WGs under the auspices of Commission V:

- Videometrics and Optical Methods for 3-D Shape Measurement VII, SanJose, USA, January 24-26, 2001
- International Workshop on Recreating the Past "Visualisation and Animation of Cultural Heritage", Ayutthaya/Thailand, February 26- March 1, 2001
- 5th Conference on Optical 3-D Measurement Techniques, Vienna/Austria, October 1-3, 2001