

3DV 2015



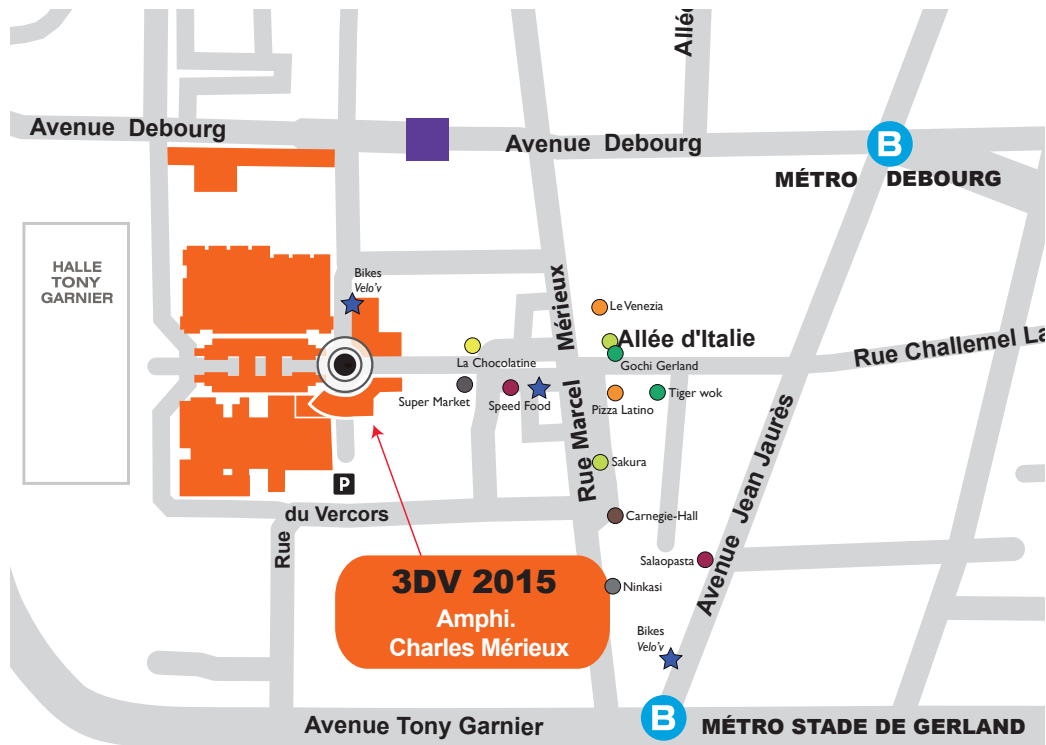
Pocket Guide

International Conference on 3D Vision

ENS, Lyon, France

October 19th - 22th, 2015

<http://www.3dv.org/>



- | | | |
|---|---|--|
|  Sandwich / salad |  Meat |  Hamburger / Beer / Music |
|  Pizza |  Sushis |  Super Market |
|  Bakery |  Wok / chinese |  Bikes |

Messages from the General and the Program Chairs

Welcome message

On behalf of the organising committee I would like to welcome you to Lyon and 3DV 2015. The conference is hosted by the Ecole Normale Supérieure de Lyon (ENS Lyon), one of the top French pluri-disciplinary higher education establishments. This year sees the 5th edition of the conference since the fusion between 3DIM and 3DPVT in 2011 and the 3rd under the name 3DV. The conference has now become a well established forum for 3D research in computer vision and in computer graphics and we hope that this year will continue to promote the emergence of a community in this field.

Hopefully you will have time to visit the great city of Lyon and its 2,000 years of history. The city is famous for its tradition of gastronomy and, in any case, make sure to attend the banquet at the abbaye de Collonges and experience there the very traditional French food.

Last but not least, I would like to express my gratitude to all the people who have contributed to the organisation of 3DV: the program committee members for their fundamental work in reviewing and selecting papers, and the organisation committee for its constant efforts to make the conference a success.

Edmond Boyer

General Chair of 3DV 2015

Messages from the General and the Program Chairs

Preface

We would like to welcome you to Lyon for the 2015 edition of the IEEE International Conference on 3D Vision (3DV 2015). In recent years, the field of 3D computer vision has grown rapidly. The fast pace of this advancement has been fueled by many recent developments, such as the advent of new sensors, and the increasing number of researchers working on novel algorithms for robust 3D and 4D scene analysis. Today, 3D Vision is a lively research area, and its relevance permeates into many other disciplines. It is the prospect of exciting new applications, for instance in robotics, autonomous systems, general scene interpretation, man-machine interaction, virtual and augmented reality, or 3D video and display, that has further added to the momentum in this field. Many of these applications require at their core the solution to many hard 3D computer vision problems. In addition, 3D vision research has an inherent strong connection to computer graphics research, and in recent years we have witnessed more and more exciting research on the boundary between the two fields. The International Conference on 3D Vision has developed into a premiere venue to showcase state-of-the-art work in 3D computer vision and related disciplines. Many fundamental challenges in 3D vision are still unresolved and we are pleased that this edition of 3DV proposes a number of important new approaches to address these open problems.

3DV 2015 received 160 valid papers submissions, of which we accepted 24 papers for oral presentation and 50 papers for poster presentation. The rapid expansion of the field and the conference has led to several changes to the review process in this year's edition. For the first time, each paper was handled by one of 20 area chairs. Each paper was assigned to an area chair who in turn assigned three reviewers out of a reviewer pool of 197 reviewers. Authors had a chance to post a rebuttal after which a reviewer discussion took place. The final decision for each paper was made by the area chairs based on reviewer recommendations and in close coordination with the program chairs.

The three-day program of oral and poster presentations is augmented with an extra day with tutorials on relevant topics on 3D Vision and graphics. We are also happy to have three invited speakers from academia and industry that will tell us about their work and share with us their vision of the future of the field.

We would like to thank everyone who helped to make this conference a success, in particular all members of the organizing committee, the area chairs, the reviewers, our invited speakers, and most importantly, the authors who have contributed the research to the conference. We would also like to thank all our sponsors, and express our gratitude to the CMT team for their support.

**Jana Kosecka, Michael Brown, and
Christian Theobalt**

Program committee Co-Chairs, 3DV2015

Organizing Committee & Area Chairs

3DV 2015 Organizing Committee

General Chair

Edmond Boyer

Program Chairs

Michael Brown

Jana Kosecka

Christian Theobalt

Tutorial/Workshop Chair

Jean-Sebastien Franco

Proceedings Chair

Franck Hetroy Wheeler

Administration Chair

Sophie Azzaro

Elodie Toihein

Communication Chair

Vanessa Peregrin

Student helpers

Benjamin Allain

Adnane Boukhayma

Mickael Heudre

Vincent Leroy

Julien Pansiot

Romain Rombourg

Aurela Shehu

Vagia Tsiminaki

Li Wang

Jinlong Yang

3DV 2015 Area Chairs

Gabriel Brostow

Daniel Cremers

Margarita Chli

Jan Michael Frahm

Jean-Sebastien Franco

Yasutaka Furukawa

Yotam Gingold

Michael Goesele

Adrian Hilton

Hiroshi Kawasaki

Vladlen Koltun

Hao Li

Hongdong Li

Marcus Magnor

Yasuyuki Matsushita

Tomas Pajdla

Bernt Schiele

Hyunjung Tai

Yu-Wing Tai

Ruigang Yang

Liang Wang

Program

| | Monday 19 | Tuesday 20 | Wednesday 21 | Thursday 22 |
|-------------|---------------|-------------------|------------------|------------------|
| 09.00-09.10 | Announcements | Opening Remarks | Announcements | Announcements |
| 09.10-10.10 | Tutorials | Keynote 1 | Keynote 2 | Keynote 3 |
| 10.10-10.40 | | Coffee Break | Coffee Break | Coffee Break |
| 10.40-12.00 | | Oral session 1 | Oral session 3 | Oral session 5 |
| 12.00-14.00 | Lunch | | | |
| 14.00-15.20 | Tutorials | Oral session 2 | Oral Session 4 | Oral session 6 |
| 15.20-16.00 | | Coffee Break | Coffee Break | Coffee Break |
| 16.00-18.00 | | Poster session 1 | Poster session 2 | Poster session 3 |
| | | Welcome Reception | Banquet | Awards & Closing |

Practical information

Networks:

1. Eduroam
2. Invites (Guest ENS Network)
login: z438563
password: PPxWUMdp

Proceedings page on the website

Password = 3DV2015

09.00-09.10 Annoncements (Amphitheatre Mérieux)**09.10-12.00 Tutorial I** (Amphitheatre Mérieux)

Semantic 3D Modelling

Organizers: Christian Haene, Marc Pollefeys, ETH Zurich

Abstract: In semantic 3D modelling the goal is to find a dense geometric model from images and at the same time also infer the semantic classes of the individual parts of the reconstructed model. Having a semantically annotated dense 3D model gives a much richer representation of the scene than just the geometry. For example questions such as what is the volume of a building can directly be answered. This is difficult with just a geometric model where the knowledge about which parts of the geometry belong to the building is not present. Also by solving the problem of dense 3D reconstruction and class segmentation jointly, prior knowledge such as the ground is usually a surface which is close to horizontal can be included.

In this tutorial, we use a volumetric representation of the scene. Traditionally, this is done as a two label problem where each voxel gets label into either being in the free space or in the occupied space. For our semantic formulation we extend the representation to a multi-label problem. A voxel either belongs to the free space or to one out of multiple semantic classes describing the occupied space. While such a formulation is quite memory intensive it allows for a very rich description of the scene. For example also not directly observed surfaces between semantic labels can be represented, for example the ground can extend underneath a building. Priors on the surface orientation, that are learnt from training data, are used to faithfully fill in such surfaces between different semantic labels.

In a first part we will introduce the multi-label formulation we are solving to facilitate semantic 3D modelling. The multi-label problem is formulated as a convex optimization problem. The domain gets treated as a continuous space which allows for fully isotropic penalization of surface areas. This reduces the artefacts of the discrete nature of the image pixel grid. In the original formulation only isotropic smoothness terms which need to form a metric over the label space were possible. We will present an

extension of these formulations to allow for non-metric and anisotropic surface penalization at the same time. The multi-label formulation is then used for our joint formulation of the dense 3D reconstruction and class segmentation. Furthermore, we will show how 3D object shape priors can be modelled.

12.00-14.00 Lunch Break**14.00-17.00 Tutorial 2** (Amphitheatre Mérieux)

Mesh Processing

Organizer: Bruno Levy, Inria Lorraine

Description: This tutorial aims at giving a panorama of algorithms used to create, manipulate and optimize 3D meshes, with a focus on some representative ones. Starting from raw 3D pointsets, I will describe a set of algorithms that can be used to reconstruct a mesh and then optimize it for different usages, such as visualization, evaluation of some shape indicators and numerical computations.

The tutorial will be illustrated with examples, all available as code sources in my Geogram/Graphite software. I will describe the implementation details with the "tips and tricks" that can make these algorithms efficient, even on multi-million points/polygons datasets. I will also describe several techniques to deal with robustness issues, develop computer arithmetics in arbitrary precision, and discuss whether it is necessary to use it or not.

Introduction

Meshes: what/why/how

1 / From points to meshes: surface reconstruction

Several categories of surface reconstruction methods
Focus on methods that use a Delaunay triangulation
Crust and Co-Cone methods, and their variants

2 / Improving the mesh: re-meshing methods

Several categories of surface remeshing algorithms

Using derivatives: focus on mesh parameterization

Using integrals: focus on centroidal Voronoi tessellation

3 / Implementation - the gritty details

– Make it as simple as possible (but not simpler)

– Halfedges and edgeuses, useful or harmful?

– Robustness and computer arithmetics

09.00-09.10 Opening Remarks

(Amphitheatre Mérieux)

09.10-10.10 Keynote I

(Amphitheatre Mérieux)

Production-oriented research on Imaging and VideoAlexander Sorkine-Hornung,
Disney Research Zurich

Abstract: Computer vision research for movies and theme park productions at Disney poses unique challenges in terms of reliability and performance of the algorithms and quality of results. For instance, many existing strategies for image-based 3D reconstruction or video processing have been carefully designed towards sparsely sampled, heterogeneous image data. Such techniques (involving, e.g., complex global optimization) usually become fundamentally impractical to apply to content captured with a dense array of modern cinema cameras at 120 fps at 4k resolution and beyond. At the same time, these methods ignore novel challenges and opportunities arising from extremely dense input. In this talk, I will present our ongoing work in the Imaging and Video Group at Disney Research on 3D scene modeling and processing from densely sampled videos and light fields, which breaks with a number of established practices in computer vision in order to achieve result quality and speed unparalleled by existing methods.

Bio: Alexander Sorkine-Hornung is Senior Research Scientist at Disney Research Zurich, heading the Imaging and Video group. Before joining Disney, Alexander was a postdoctoral researcher at the Computer Graphics Laboratory at ETH Zurich. He obtained his PhD in Computer Science at RWTH Aachen in 2008. Alexander's research interests lie in all areas related to digital image and video processing. A representative list of topics includes light field and video processing, big data imaging, image-based 3D reconstruction and rendering, color processing, stereoscopy, and visual saliency analysis. Furthermore, he is interested in innovative applications of image-

based technologies in the fields of 2D animation and interactive environments. In 2012 Alexander received the Eurographics Young Researcher Award. The research and technologies developed by his group already had significant impact on various Disney park attractions and movie productions, with film credits on movies such as Maleficent, Cinderella, and Big Hero 6.

10.10-10.40 Coffee Break

(Exposition Hall)

10.40-12.00 Oral session I

(Amphitheatre Mérieux)

Chair: Michael Goesele

10.40 - Depth Fields: Extending Light Field**Techniques to Time-of-Flight Imaging**Suren Jayasuriya, Adithya Pediredla, Sriram
Sivaramakrishnan, Alyosha Molnar, Ashok
Veeraraghavan, Yuichi Iwazaki**11.00 - Towards Probabilistic Volumetric
Reconstruction using Ray Potentials**

Ali Ulusoy, Andreas Geiger, Michael Black

**11.20 - Multi-view Reconstruction of
Highly Specular Surfaces in Uncontrolled
Environments**Clément Godard, Peter Hedman, Wenbin Li,
Gabriel Brostow**11.40 - x-hour Outdoor Photometric Stereo**Yannick Hold-Geoffroy, Jinsong Zhang, Paulo F. U.
Gotardo, Jean-Francois Lalonde**12.00-14.00 Lunch Break**

14.00-15.20 Oral session 2

(Amphitheatre Mérieux)

Chair: Philippos Mordohai

14.00 - Automatic Recovery of Networks of Thin Structures

Meng Song, Daniel Huber

14.20 - Global Mesh Denoising with Fairness
Sk. Mohammadul Haque, Venu Madhav Govindu**14.40 - Graph Edit Distance based on Triangle-Stars Decomposition for Deformable 3D Objects Recognition**

Kamel Madi, Eric Paquet, Hamida Seba, Hamamache Kheddouci

15.00 - Motion Cooperation: Smooth Piece-Wise Rigid Scene Flow from RGB-D Images
Mariano Jaimez Tarifa, Mohamed Souiai, Jörg Stückler, Daniel Cremers, Javier Gonzalez-Jimenez,**15.20-16.00 Coffee Break**
(Exposition Hall)**16.00-18.00 Posters session I**
(Exposition Hall)**1. Ensemble Classifier for Combining Stereo Matching Algorithms**

Aristotle Spyropoulos, Philippos Mordohai

2. RGB-D Visual Search with Compact Binary Codes

Alioscia Petrelli, Danilo Pau, Emanuele Plebani, Luigi Di Stefano

3. Establishing a Probabilistic Depth Map from Focused Plenoptic Cameras

Niclas Zeller, Franz Quint, Uwe Stilla,

4. A 3D Scene Analysis Framework and Descriptors for Risk Evaluation

Rob Dupre, Vasilis Argyriou, Georgios Tzimiropoulos, Darrel Greenhill

5. Segmentation of 3D Lidar points using Extruded Surface of Cross Section

Hitoshi Niigaki, Jun Shimamura, Akira Kojima

6. A Multi-View Structured Light System for Highly Accurate 3D Modeling

Hyowon Ha, Tae-Hyun Oh, In So Kweon

7. Dense Depth and Albedo from a Single-shot Structured Light

Hyowon Ha, Jaesik Park, In So Kweon

8. Convolutional Fisher Kernels for RGB-D Object Recognition

Yanhua Cheng, Rui Cai, Xin Zhao, Kaiqi Huang

9. Consistent 3D Background Model Estimation from Multi-Viewpoint Videos

Iraklis Tsekourakis, Philippos Mordohai

10. Interference-free Epipole-centered Structured Light Pattern for Mirror-based Multi-view Active Stereo

Tomu Tahara, Ryo Kawahara, Shohei Nobuhara, Takashi Matsuyama

11. Continuous Symmetric Stereo with Adaptive Outlier Handling

Chen Li, Lap-Fai Yu, Zhichao Lu, Yasuyuki Matsushita, Kun Zhou, Stephen Lin

12. Fast and Robust Multi-View 3D Object Recognition in Point Clouds
Guan Pang, Ulrich Neumann

- 13. Confidence Estimation for Superpixel-based Stereo Matching**
Rafael Guveia, Aristotle Spyropoulos, Philippos Mordohai
- 14. Accurate and Practical 3D Measurement for Translucent Objects by Dashed Lines and Complementary Gray Code Projection**
Toshihiro Kobayashi, Tomoaki Higo, Masayoshi Yamasaki, Kiwamu Kobayashi, Akihiro Katayama
- 15. Low-Cost Depth and Radiological Sensor Fusion to Detect Moving Sources**
Phillip Riley, Andreas Enqvist, Sanjeev Koppal
- 16. Domain adaptation for structure recognition in different building styles**
Zhizhong Li, Daniel Huber
- 17. Half-Occluded Regions and Detection of Pseudoscopy**
Jonathan Bouchard, Yasin Nazzar, James Clark
- 18. Depth Fields: Extending Light Field Techniques to Time-of-Flight Imaging**
Suren Jayasuriya, Adithya Pediredla, Sriram Sivaramakrishnan, Alyosha Molnar, Ashok Veeraghavan
- 19. Towards Probabilistic Volumetric Reconstruction using Ray Potentials**
Ali Ulusoy, Andreas Geiger, Michael Black
- 20. Multi-view Reconstruction of Highly Specular Surfaces in Uncontrolled Environments**
Clément Godard, Peter Hedman, Wenbin Li, Gabriel Brostow
- 21. x-hour Outdoor Photometric Stereo**
Yannick Hold-Geoffroy, Jinsong Zhang, Paulo F. U. Gotardo, Jean-Francois Lalonde

- 22. Automatic Recovery of Networks of Thin Structures**
Meng Song, Daniel Huber
- 23. Global Mesh Denoising with Fairness**
Sk. Mohammadul Haque, Venu Madhav Govindu
- 24. Graph Edit Distance based on Triangle-Stars Decomposition for Deformable 3D Objects Recognition**
Kamel Madi, Eric Paquet, Hamida Seba, Hamamache Kheddouci
- 25. Motion Cooperation: Smooth Piece-Wise Rigid Scene Flow from RGB-D Images**
Mariano Jaimez Tarifa, Mohamed Souiai, Jörg Stückler, Daniel Cremers, Javier Gonzalez-Jimenez
- 26. Census-Based Cost on Gradients for Matching under Illumination Differences**
Christos Stentoumis, George Karras, Aggelos Amditis

18.30-21.00 Welcome reception
(Exposition Hall)

09.00-09.10 Announcements

(Amphitheatre Mérieux)

09.10-10.10 Keynote 2

(Amphitheatre Mérieux)

3D Vision at Autodesk

Luc Robert, Autodesk

Abstract: Through examples such as 123d® Catch®, Autodesk® Recap® or Memento®, we will show how 3D vision has surfaced on different markets and in different products at Autodesk, and has become a reality for many users. Through the lens of concrete applications and use cases, we will take a look at the current status and upcoming challenges for 3D vision.

Bio: Luc Robert obtained his PhD in 1993 from Inria/Ecole Polytechnique. After a 1-year post-doc at Carnegie Mellon University, he joined Inria in 1995 as a Research Scientist. In 1998, he started the REALVIZ company, acquired by Autodesk in 2008. He is now Senior Software Architect for the Reality Solutions department at Autodesk, that develops technologies and products related to photogrammetry and 3D scanning

10.10-10.40 Coffee Break

(Exposition Hall)

10.40-12.00 Oral session 3

(Amphitheatre Mérieux)

Chair: Ioannis Stamos

10.40 - Efficient Large-Scale Point Cloud Registration Using Loop Closures

Takaaki Shiratori, Jerome Berclaz, Michael Harville, Chintan Shah, Taoyu Li, Yasuyuki Matsushita, Stephen Shiller

11.00 - MLMD: Maximum Likelihood Mixture Decoupling for Fast and Accurate Point Cloud Registration

Benjamin Eckart, Kihwan Kim, Alejandro Troccoli, Alonzo Kelly, Jan Kautz

11.20 - Procrustean point-line registration and the NPNP problem

Andrea Fusiello, Fabio Crosilla, Francesco Malapelle

11.40 - Accurate Isosurface Interpolation with Hermite Data

Simon Fuhrmann, Michael Kazhdan, Michael Goesele

12.00-14.00 Lunch Break**14.00-15.20 Oral session 4**

(Amphitheatre Mérieux)

Chair: Jean Sebastien Franco

14.00 - 3D surface reconstruction from point-and-line cloud

Takayuki Sugiura, Akihiko Torii, Masatoshi Okutomi

14.20 - Learning Hierarchical Semantic Segmentations of LIDAR Data

David Dohan, Brian Matejek, Thomas Funkhouser

14.40 - Segmentation based features for wide-baseline multi-view reconstruction

Armin Mustafa, Hansung Kim, Evren Imre, Adrian Hilton

15.00 - 3D Modeling on the Go: Interactive 3D Reconstruction of Large-Scale Scenes on Mobile Devices Thomas Schöps, Torsten Sattler, Christian Häne, Marc Pollefeys

15.20-16.00 Coffee Break
(Exposition Hall)**16.00-18.00 Posters session 2**
(Exposition Hall)**1. On Computing the Translations Norm in the Epipolar Graph**

Federica Arrigoni, Andrea Fusiello, Beatrice Rossi

2. Multi-Label Object Categorization Using Histograms of Global Relations

Wail Mustafa, Hanchen Xiong, Dirk Kraft, Sandor Szedmak, Justus Piater, Norbert Krüger

3. LiveScan3D: A Fast and Inexpensive 3D Data Acquisition System for Multiple Kinect v2 Sensors

Marek Kowalski, Jacek Naruniec, Michael Daniluk

4. Optimal Camera Parameters for Depth from Defocus

Fahim Mannan, Michael Langer

5. Light-Field Microscopy with a Consumer Light-Field Camera

Lois Mignard-Debise, Ivo Ihrke

6. Non-Parametric Spectral Model for Shape Retrieval

Andrea Gasparetto, Giorgia Minello, Andrea Torsello

7. Matchability Prediction for Full-Search Template Matching Algorithms

Adrian Penate-Sanchez, Lorenzo Porzi, Francesc Moreno-Noguer

8. Automatic Indoor 3D Surface**Reconstruction with Segmented Building and Object Elements**

Eric Turner, Avideh Zakhor

9. Repeatable Local Coordinate Frames for 3D Human Motion Tracking: from Rigid to Non-Rigid

Chun-Hao Huang, Federico Tombari, Nassir Navab

10. Online classification in 3D urban datasets based on hierarchical detection

Thomas Flynn, Olympia Hadjiladis, Ioannis Stamos

11. Cultural Heritage Acquisition: Geometry-Based Radiometry in the Wild

Thomas Hoell, Axel Pinz

12. Local Hough Transform for 3D Primitive Detection

Bertram Drost, Slobodan Ilic

13. Multiscale Retinex Aggregation to Enable Robust Dense Stereo Correspondence

Xiongbiao Luo, Uditha L. Jayarathne, A. Jonathan McLeod, Stephen Pautler, Terry M. Peters, Stephen Pautler

14. Accelerated Relative Camera Pose from Oriented Features

Steven Mills

15. Approximate 3D Partial Symmetry Detection Using Co-Occurrence Analysis

Chuan Li, Michael Wand, Xiaokun Wu, Hans-Peter Seidel

16. Synchronization and Self-Calibration for Helmet-Held Consumer Cameras, Applications to Immersive 3D Modeling and 360 Video

Maxime Lhuillier, Thanh-Tin Nguyen

17. 3-D Tessellation of Plant Tissue – A dual optimization approach to cell-level meristem reconstruction from microscopy images
Guillaume Cerutti, Sophie Ribes, Carlos Galvan Ampudia, Teva Vernoux, Christophe Godin

18. Efficient Large-Scale Point Cloud Registration Using Loop Closures
Takaaki Shiratori, Jerome Berclaz, Michael Harville, Chintan Shah, Taoyu Li, Yasuyuki Matsushita, Stephen Shiller

19. FMLMD: Maximum Likelihood Mixture Decoupling for Fast and Accurate Point Cloud Registration
Benjamin Eckart, Kihwan Kim, Alejandro Troccoli, Alonzo Kelly, Jan Kautz

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23. Learning Hierarchical Semantic Segmentations of LIDAR Data
David Dohan, Brian Matejek, Thomas Funkhouser

24. Segmentation based features for wide-baseline multi-view reconstruction
Armin Mustafa, Hansung Kim, Evren Imre, Adrian Hilton

25. 3D Modeling on the Go: Interactive 3D Reconstruction of Large-Scale Scenes on Mobile Devices
Thomas Schöps, Torsten Sattler, Christian Häne, Marc Pollefeys

26. Planes Detection for Robust Localization and Mapping in RGB-D SLAM systems
Hakim El Chaoui El Ghor, David Roussel, Fakhreddine Ababsa, El Houssine BouyakhfWe

18.15 Departure for the conference banquet

Two meeting points for the boat:

18.15: conference site

18.30: at the landing stage, Quai du Canada, near the Novotel Gerland at the « Pont Pasteur » Bridge.

20.00-23.00 Conference banquet

Abbaye de Collonges - Paul Bocuse
Situated 5 km north of Lyon, on the banks of the Saône, the Abbaye de Collonges looks forward to welcoming you in a unique and outstanding setting.

*Quai de la jonchère
69660 Collonges au Mont d'Or*

23.00 Return by bus

Departure: Abbaye de Collonges - 23.00
Arrivals:

- Place Bellecour 23.25
- Conference site 23.40

09.00-09.10 Announcements

(Amphitheatre Mérieux)

09.10-10.10 Keynote 3

(Amphitheatre Mérieux)

**4D Vision for Video-Realistic
Interactive Animation**

Adrian Hilton, University of Surrey

Abstract: Over the past decade advances in computer vision have enabled the 3D reconstruction of dynamic scenes from multiple view video. This has allowed video-based free-viewpoint rendering with the photo-realism of video whilst allowing interactive viewpoint control. This technology initially pioneered for highly controlled indoor scenes has been extended to free-viewpoint rendering of large-scale outdoor scenes such as sports for TV production. Free-viewpoint video content is limited to the replay of the captured performance. This talk will present results of recent research in 4D vision research for actor performance capture which allows both video-realistic free-viewpoint rendering and interactive control of movement. Recent research has introduced methods for spatio-temporal alignment and parametric representation of dynamic shape and appearance from capture performance to allow interactive control whilst maintaining the realism of the captured video. This opens-up the potential for reuse of 4D performance capture to create video-realistic characters for immersive entertainment. This talk will review recent advances and identify future research challenges for 4D vision in entertainment and human motion analysis.

Bio: Adrian Hilton, BSc(hons), DPhil, CEng, is Professor of Computer Vision and Graphics and Director of the Centre for Vision, Speech and Signal Processing at the University of Surrey, UK. He leads research investigating the use of computer vision for applications in entertainment content production,

visual interaction and clinical analysis.

His interest is in robust computer vision to model and understand real world scenes and his work in bridging-the-gap between real and computer generated imagery combines the fields of computer vision, graphics and animation to investigate new methods for reconstruction, modelling and understanding of the real world from images and video. Applications include: sports analysis (soccer, rugby and athletics), 3D TV and film production, visual effects, character animation for games, digital doubles for film and facial animation for visual communication. Contributions include technologies for the first hand-held 3D scanner, modeling of people from images and 3D video for games, broadcast and film production. Current research is focused on video-based measurement in sports, multiple camera systems in film and TV production, and 3D video for highly realistic animation of people and faces. Research is conducted in collaboration with UK companies and international institutions in the creative industries

Adrian is currently the Principal Investigator of the multi-million EPSRC Programme Grant S3A: 'Future Spatial Audio for Immersive Listener Experience at Home' (2013-2018), he also leads several EU and UK/ industry projects. Adrian currently holds a 5-year Royal Society Wolfson Research Merit Award (2013-2018).

10.10-10.40 Coffee Break

(Exposition Hall)

10.40-12.00 Oral session 5

(Amphitheatre Mérieux)

Chair: Jean Francois Lalonde

**10.40 - Shadow Detection and Sun Direction in
Photo Collections**

Scott Wehrwein, Kavita Bala, Noah Snavely

11.00 - A Bayesian Approach for Selective Image-Based Rendering using Superpixels
Rodrigo Ortiz-Cayon, Abdelaziz Djelouah, George Drettakis

11.20 - Video based Animation Synthesis with the Essential Graph
Adnane Boukhayma, Edmond Boyer

11.40 - The Geometry of Colorful, Lenticular Fiducial Markers
Ian Schillebeeckx, Joshua Little, Brendan Kelly, Robert Pless

12.00-14.00 Lunch Break

14.00-15.20 Oral session 6
(Amphitheatre Mérieux)
Chair: Adrian Hilton

14.00 - A Combined Generalized and Subject-Specific 3D Head Pose Estimation
David Joseph Tan, Federico Tombari, Nassir Navab

14.20 - Dictionary Learning based 3D Morphable Model Construction for Face Recognition with Varying Expression and Pose
Claudio Ferrari, Giuseppe Lisanti, Stefano Berretti, Alberto Del Bimbo

14.40 - Monocular 3D human pose estimation with a semi-supervised graph-based method
Mahdieh Abbasi, Hamid Reza Rabiee, Christian Gagné

15.00 - Point Pair Features Based Object Detection and Pose Estimation Revisited
Tolga Birdal, Slobodan Ilic

15.20-16.00 Coffee Break
(Exposition Hall)

16.00-18.00 Posters session 3
(Exposition Hall)

- 1. Super-Resolution Keyframe Fusion for 3D Modeling with High-Quality Textures**
Robert Maier, Joerg Stueckler, Daniel Cremers
- 2. Towards Skeleton based Reconstruction: From Projective Skeletonization to Canal Surface Estimation**
Bastien Durix, Morin Geraldine, Sylvie Chambon, Celine Roudet, Lionel Garnier
- 3. Estimation of Branch Angle from 3D Point Cloud of Plants**
Lu Lou
- 4. Unsupervised Temporal Segmentation of Repetitive Human Actions Based on Kinematic Modeling and Frequency Analysis**
Qifei Wang, Gregorij Kurillo, Ferda Ofli, Ruzena Bajcsy
- 5. On Preserving Structure in Stereo Seam Carving**
Kuo-Chin Lien, Matthew Turk
- 6. Depth Estimation Based on an Infrared Projector and an Infrared Color Stereo Camera by Using Cross-based Dynamic Programming with Cost Volume Filter**
Kensuke Hisatomi, Masanori Kano, Kensuke Ikeya, Miwa Katayama, Tomoyuki Mishina, Yuichi Iwade, Kiyoharu Aizawa
- 7. Audio Visual Synchronization of Rhythm**
Andrew Godbout, Jeffrey Boyd

-
- 8. Super Generalized 4PCS for 3D Registration**
Mustafa Mohamad, Mirza Tahir Ahmed, David Rappaport, Michael Greenspan
 - 9. Reconstructing Street-Scenes in Real-Time From a Driving Car**
Vladislav Usenko, Jakob Engel, Jörg Stückler, Daniel Cremers
 - 10. Ground Segmentation based on Loopy Belief Propagation of Sparse 3D Point Clouds**
Mingfang Zhang, Daniel Morris, Rui Fu
 - 11. A New Flying Range Sensor: Aerial Scan in Omini-directions**
Bo Zheng, Xiangqi Huang, Ryoichi Ishikawa, Takeshi Oishi, Katsushi Ikeuchi
 - 12. Tracking fractures of deformable objects in real-time with an RGB-D sensor**
Antoine Petit, Vincenzo Lippiello, Bruno Siciliano
 - 13. Estimating surface normals with depth image gradients for fast and accurate registration**
Yosuke Nakagawa, Hideaki Uchiyama, Hajime Nagahara, Rin-ichiro Taniguchi
 - 14. Reconstruction of 3D Pose for Surfaces of Revolution from Range Data**
Georgios Pavlakos, Kostas Daniilidis
 - 15. Shadow Detection and Sun Direction in Photo Collections**
Scott Wehrwein, Kavita Bala, Noah Snavely
 - 16. A Bayesian Approach for Selective Image-Based Rendering using Superpixels**
Rodrigo Ortiz-Cayon, Abdelaziz Djelouah, George Drettakis
 - 17. Video based Animation Synthesis with the Essential Graph**
Adnane Boukhayma, Edmond Boyer
 - 18. The Geometry of Colorful, Lenticular Fiducial Markers**
Ian Schillebeeckx, Joshua Little, Brendan Kelly, Robert Pless,
 - 19. A Combined Generalized and Subject-Specific 3D Head Pose Estimation**
David Joseph Tan, Federico Tombari, Nassir Navab
 - 20. Dictionary Learning based 3D Morphable Model Construction for Face Recognition with Varying Expression and Pose**
Claudio Ferrari, Giuseppe Lisanti, Stefano Berretti, Alberto Del Bimbo
 - 21. Monocular 3D human pose estimation with a semi-supervised graph-based method**
Mahdieh Abbasi, Hamid Reza Rabiee, Christian Gagne
 - 22. Point Pair Features Based Object Detection and Pose Estimation Revisited**
Tolga Birdal, Slobodan Ilic
- 17.30-18.00 Awards and Closing**
(Amphitheatre Mérieux)

Tourism information



Some museums

Musée des Confluences (Museum Confluences)

Situated close to the conference venue, on the confluence of the Rhone and the Saône, the Musée des Confluences is an absolute must-see in Lyon. Set in the heart of a monumental structure of metal and glass, the Musée des Confluences presents a journey through time and across continents to observe the world around us.

<http://www.museedesconfluences.fr/fr/visit-museum>

Musée d'Art Contemporain (Museum of Modern Art)

This museum is primarily for artists: The walls are moving, while inside the museum is modular, partitions can be assembled or disassembled to meet the requirements of artists (rollercoaster in the museum, saltwater pool are works that have already been made in this museum ...).

<http://www.mac-lyon.com/mac/sections/en/>

Musées Gallo-Romains (Gallo Roman Museum):

In ancient times, Vienna, capital of a vast territory stretching from each side of the Rhône. Today, the archaeological site and museum of Saint-Romain-en-Gal transport visitors 2,000 years ago, in one of the richest cities of Roman Gaul.

<http://www.musees-gallo-romains.com/en>

Musée des Beaux Arts (Museum of Fine Arts)

The museum offers large exhibitions, cultural

activities to the attention of all audiences to discover or deepen the art.

<http://www.mba-lyon.fr/mba/sections/languages/english/museum>

Musée Lumière

The Institut Lumière dedicates its activity to the dissemination and preservation of world film heritage in many forms.

<http://www.institut-lumiere.org/musee/présentation/presentation-english.html>

Musées Gadagne

This museum is located in the heart of Old Lyon, in the Saint-Jean in Lyon. It consists of the history museum of Lyon and museum of world puppets

[http://www.gadagne.musees.lyon.fr/index.php/gadagne/\(langue\)/en](http://www.gadagne.musees.lyon.fr/index.php/gadagne/(langue)/en)

Places to see

Le Vieux Lyon

Le vieux-lyon is the main part of the conservation area of the city of Lyon.

It is the medieval and Renaissance district of Lyon. It is located along the Saône at the foot of the Fourvière hill. This is one of the largest districts regarding this medieval period and the Renaissance (with Venice) that is still intact to this day.

<http://www.vieux-lyon.org/webphone/menu-us.htm>

La Basilique Notre-Dame de Fourvière

La Basilique Notre-Dame de Fourvière dominates the city of Lyon from the top of the Fourvière

Tourism information

hill, on the site of the ancient Trajan's Forum. Its architecture of neo-Byzantine or Roman-Byzantine style is the work of Pierre Bossan.
<http://www.fourviere.org/en/>

La place Bellecour

Place Bellecour or Place Louis-le-Grand is the largest square in Lyon and the fifth largest square in France after the Quinconces in Bordeaux, the Place de la Concorde in Paris, the Leopold Courts and Place Carnot in Nancy and the place of the town hall in Havre.

<http://www.en.lyon-france.com/>

Parc de la Tête d'Or

The parc de la Tête d'Or is an urban park in Lyon, one of the largest in France; managed by the city of Lyon and true heart of the town, the park offers over 117 hectares a vast natural area in the heart of the city.

<http://www.loisirs-parcdelatetedor.com/en/>

L'Opéra de Lyon

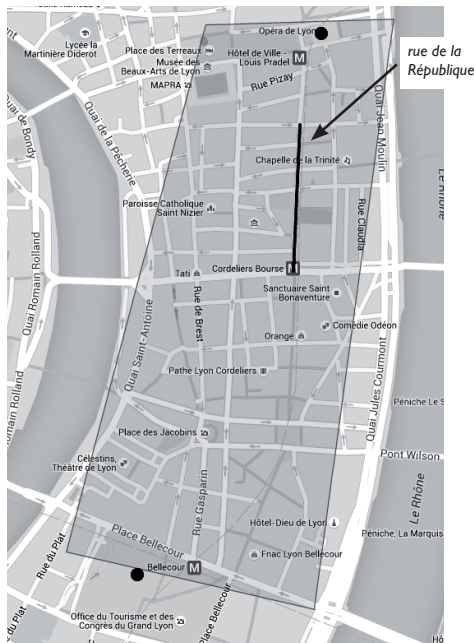
Opera de Lyon said sometimes the New Opera is an opera house located near the town hall of Lyon, and housing dining representations primarily for Lyon National Opera which represent them operas, ballets and concerts.

<http://www.france.fr/en/art-and-culture/lyon-opera-house.html>



Shopping

A great area for shopping in Lyon is located between *Place Bellecour* and the *Lyon Opera* (shaded area on the map) and spreads around *rue de la République*.



Tourism information

Gourmet addresses

CHOCOLATES & CANDY SHOPS

Chocolates Voisin

One of Lyon's leading chocolate makers since 1897, our range of high quality artisanal chocolates is made from selected raw materials. Creator of Lyon's leading confectionery speciality: «Le Coussin de Lyon».

<http://www.chocolat-voisin.com/>

Palomas

Palomas has been an expert chocolate and confectionery maker since 1917 in Lyon - Bellecour. We propose our chocolate and confectionery specialties unique of their kind in France including: Délicias, Amandes de Bellecour and Palets de Fourvière.

<http://www.chocolatier-palomas.com/>

Sève chocolats

A master chocolate maker among France's 10 leading chocolate makers, Richard Sève is a specialist, and some would say a magician, when it comes to chocolate and an expert in French-style confectionary techniques. Don't miss the authentic praline tarts.

<http://www.chocolatseve.com/>

LYON SPECIALITIES

Charcuterie Sibila

Delicatessen specialising in typically Lyonnais products including: saveloy, quenelles, pork slicing sausage and chitterling sausage...

<http://www.charcuterie-sibilia.com/>

Saint Jean Délices

Traditional Lyonnais specialties on sale including: coussins, cocons, quenelles, pavés du Vieux-Lyon, rochettes, sugared almonds, etc., in addition to

those of the other French regions.

<http://www.saintjeandelices.com/>

Giraudet

Specialising in quenelles made from durum wheat semolina (instead of flour). Quenelles with crayfish, with pike, and with truffles, etc., Nantua, tomato or financière sauces, etc. Cookery classes also available. Tasting room.

<http://www.giraudet.fr/>

La Vieille Conserverie

La Vieille Conserverie is a specialist in gourmet tinned foods. Discover a wealth of highly original gourmet dishes including specialties from Lyon, the south-west and Brittany, etc.

<http://www.lavieilleconserverie.fr/>

A la Marquise

Situated in the Maison du Chamarier in Vieux Lyon since 1891, this cake shop and tea room offers the finest of Lyonnais specialties, including praline tarts, 'bugnes' pastries and praline brioches.

<http://www.alamarquise.fr/>

ICE CREAM SHOPS

Terra Adélice

Conveniently located at the corner of the charming and shady Place de la Baleine, living glacier Terre Adélice offers the opportunity to taste a variety of ice cream with different flavors on the terrace or take horn or potty.

www.terre-adelice.eu/

A la Marquise

Glacier from father to son and from father to daughter since 1899. René Nardone Glacier, offers a variety of ice creams adaptable to individual needs!

<http://www.alamarquise.fr/>

Sponsors



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