

Report about 20th ACM Virtual Reality Software Technology (VRST 2014)

Taku Komura (University of Edinburgh)

1. Overview

The VRST 2014 conference was held in the Informatics Forum, School of Informatics, University of Edinburgh on 11-13th November. The ACM Symposium on Virtual Reality Software and Technology (VRST) is a prestigious international forum for the exchange of experience and knowledge among researchers and developers concerned with virtual reality software and technology. It has been previously held around the world (Singapore, Toronto, Hong Kong, Kyoto, Bordeaux, Newport Beach etc.) in great success and this is the 20th anniversary. The VRST technical program consists of high quality technical papers that are reviewed and selected by an international program committee. Papers are solicited on all technical aspects of Virtual Reality and related technologies. The organization of the conference is as follows:

Conference Co-Chairs:

- Rynson Lau, City University of Hong Kong
- Dinesh Manocha, University of North Carolina, Chapel Hill

Programme Co-Chairs:

- Taku Komura, University of Edinburgh
- Aditi Majumder, University of California, Irvine
- Weiwei Xu, Hangzhou Normal University

Local Co-Chairs:

- Joseph Henry, University of Edinburgh
- Hubert Shum, Northumbria University

2. Participants

This year, the conference has successfully attracted 70 participants from around the world (including 9 PhD students from Scottish institutes). Below is the list of Scottish students who participated the conference

CJ Davies (University of St. Andrews).
Craig McMillan (Edinburgh Napier University)
Mark Miller (University of Edinburgh)
Vladmir Ivan (University of Edinburgh)
Daniel Holden (University of Edinburgh)
Rami Ali Al-Ashqar (University of Edinburgh)
Steven McDonagh (University of Edinburgh)
Lucas Teixeira (University of Edinburgh)
Mihaela Dragomir (University of Edinburgh)

3. Statistics

This year, VRST received 108 submissions from 30 countries. The international program committee was made up of 67 esteemed researchers. The program committee accepted 16 full papers, and 10 short papers. Some regular submissions with minor limitations but with high potential were accepted as short papers (an acceptance rate of 14.8% for full papers and 24.8% overall). The program also

included 18 posters and demonstrations. The conference covered a wide range of topics including computer animation, crowd simulation, user studies, 3D hardware devices, perception, fluid simulation, and human interfaces.

4. Conference Program

The program of the conference is as follows:

Tuesday, November 11th

09:00 - **Opening**
09:10 am

09:10 - **Device and Interface**
10:20 am

DigiTap: An Eyes-Free VR/AR Symbolic Input Device (Long paper)
Manuel Prätorius, Dimitar Valkov, Ulrich Burgbacher, Klaus Hinrichs

Robust 6-DOF Immersive Navigation Using Commodity Hardware (Short paper)
Ludovico Carozza, Frederic Bosche, Mohamed Abdel-Wahab

Navigating Immersive Virtual Environments through a Foot Controller (Short paper)
Marcello Carrozzino, Giovanni Avveduto, Franco Tecchia, Pavel Gurevich, Benjamin Cohen

AnyHaptics: A Haptic Plug-in for Existing Interactive 3D Graphic Applications (Short paper)
Deokjae Song, Jinah Park

10:45 - **Graphics**
12:15 pm

Multiphase Surface Tracking With Explicit Contouring (Long paper)
Xiaosheng Li, Xiaowei He, Xuehui Liu, Baoquan Liu, Enhua Wu

Model Topology Change with Correspondence using Electrostatics (Short paper)
Peter Sandilands, Taku Komura

Robust Random Dot Markers: towards augmented unprepared maps with pure geographic features (Long paper)
Liming Yang, Jean-Marie Normand, Guillaume Moreau

Third Person View + Guidance For More Natural Motor Behaviour In Immersive Basketball Playing (Long paper)
Alexandra Covaci, Anne-Helene Olivier, Franck Multon

12:15 - **Lunch**
14:00 pm

14:00 - **Tracking and Recognition**
15:35 pm

A Hand Posture Recognition System Utilizing Frequency Difference of Infrared Light (Short paper)
Soonchan Park, Moonwook Ryu, Ju Young Chang, Jiyoung Park

Illumination Independent Marker Tracking using Cross-Ratio Invariance (Short

paper)
Vincent Agnus, Stéphane Nicolau, Luc Soler

I'm in VR!: using your own hands in a fully immersive MR system (Short paper)
Franco Tecchia, Giovanni Avveduto, Raffaello Brondi, Marcello Carrozzino,
Massimo Bergamasco, Leila Alem

Accelerating Vision-based 3D Indoor Localization by Distributing Image Processing over Space and Time (Long paper)
Doohee Yun, Hyunseok Chang, T.V. Lakshman

User-Perspective Augmented Reality Magic Lens From Gradients (Long paper)
Domagoj Baričević, Tobias Höllerer, Pradeep Sen, Matthew Turk,

16:00 -
17:30 pm

Poster Presentations

Expand: A Stereoscopic Expanding Technique for Compound Graphs (Poster)
Ragaad Altarawneh, Shah Rukh Humayoun, Achim Ebert

Poxels: Polygonal Voxel Environment Optimizations for Improved Storage and Rendering (Poster)
Mark Miller, Kevin Chalmers, Benjamin Kenwright, Kenny Mitchell

Cost Based Estimation of Intended Locomotion Targets (Poster)
Markus Zank, Andreas Kunz

A Perspective Geometry Approach to User-Perspective Rendering in Hand-Held Video See-Through Augmented Reality(Poster)
Ali Samini, Karljohan Lundin Palmerius

Synchronized AR Environment for Multiple Users Using Animation Markers (Poster)
Hirotake Yamazoe, Tomoko Yonezawa

Dissection of Hybrid Soft Tissue Models Using Position-based Dynamics (Poster)
Junjun Pan, Junxuan Bai, Xin Zhao, Aimin Hao, Hong Qin

A Portable Interface for Tangible Exploration of Volumetric Data (Poster)
Paul Issartel, Florimond Guéniat, Mehdi Ammi

Natural 7-DoF Navigation & Interaction in 3D Geovisualisations (Poster)
Simon Stannus, Arko Lucieer, Wai-Tat Fu

A Projection-Based Mixed-Reality Display for Exterior and Interior of a Building Diorama (Poster)
Ming Zhang, Itaru Kitahara, Yoshinari Kameda, Yuichi Ohta

On the Benefits of Stereo Graphics in Virtual Obstacle Avoidance Tasks (Poster)
J. Andreas Bærentzen, Rasmus Stenholt

Optimum Design of Haptic Seat for Driving Simulator (Poster)
Osama Halabi, Mariam Ba Hameish, Latefa Al-Naimi, Amna Al-Kaabi

FishEyA: Live Broadcasting Around 360 Degrees (Poster)

Canessa Enrique, Livio Tenze

Virtualized Welding: A New Paradigm for Tele-Operated Welding (Poster)
Bo Fu, Yukang Liu, Yuming Zhang and Ruigang Yang

The Collaborative Design Platform Protocol - A Protocol for a Mixed Reality Installation for Improved Incorporation of Laypeople in Architecture (Poster)
Tibor Goldschwendt, Christoph Anthes, Gerhard Schubert, Frank Petzold and Dieter Kranzlmüller

View from the Hill: where cross reality meets virtual worlds (Poster)
Christopher Davies and Alan Miller

FingerOscillation: Clutch-free Techniques for 3D Object Translation, Rotation and Scale (Poster)
Siju Wu, Amine Chellali, Samir Otmane

Braiding hair by Braid Theory (Poster)
Gaoxiang Zeng, Taku Komura

Dual Sensor Filtering for Robust Tracking of Head-Mounted Displays (Poster)
Nicholas T. Swafford, Bastiaan J. Boom, Kartic Subr, David Sinclair, Darren Cosker, Kenny Mitchell

17:30 pm onwards **Poster Session and Reception at the Informatics Forum**

The size of poster boards is 114 cm x 84 cm (can possibly hang A0 size).

Wednesday, November 12th

09:10 - 10:10 am **Invited Talk: Pushmeet Kohli**

10:35 - 12:15 pm **Character Animation**

A Multi-resolution Approach for Adapting Close Character Interaction (Long paper)
Edmond S. L. Ho, He Wang, Taku Komura

Data-driven Sequential Goal Selection Model for Multi-agent Simulation (Long paper)
Wenxi Liu, Zhe Huang, Rynson W. H. Lau, Dinesh Manocha

Posture Reconstruction Using Kinect with a Probabilistic Model (Long paper)
Liuyang Zhou, Zhiguang Liu, Howard Leung, Hubert P. H. Shum

Towards Real-Time Credible and Scalable Agent-Based Simulations of Autonomous Pedestrians Navigation (Long paper)
Patrick Simo Kanmeugne, Aurélie Beynier

12:15 - 13:20 pm **Lunch**

13:20 - **User Study and Data Analysis**
15:05 pm

Simulator Sickness and Presence using HMDs: comparing use of a game controller and a position estimation system(Short paper)
Gerard Llorach, Alun Evans, Josep Blat

Desktop Virtual Reality for Emergency Preparedness: User Evaluation of an Aircraft Ditching Experience under Different Fear Arousal Conditions (Long paper)
Luca Chittaro, Fabio Buttussi, Nicola Zangrando

Profiling and benchmarking event and message-passing-based asynchronous Realtime Interactive Systems (Long paper)
Stephan Rehfeld, Henrik Tramberend , Marc Erich Latoschik

Performance Improvement using Data Tags for Handheld Spatial Augmented Reality (Short paper)
Andrew Irlitti, Stewart Von Itzstein, Ross Smith, Bruce Thomas

A Usability Scale for Handheld Augmented Reality (Long paper)
Marc Ericson Santos, Jarkko Polvi, Takafumi Taketomi, Goshiro Yamamoto, Christian Sandor and Hirokazu Kato

15:05 pm **Local tour (Edinburgh Castle)**

19:30 pm onwards **Banquet ([Playfair Library Hall](#))**

Thursday, November 13th

09:15 - **Invited Talk: Niloy Mitra**
10:15 am

10:45 - **Perception**
12:15 pm

Threefolded Motion Perception During Immersive Walkthroughs (Long paper)
Gerd Bruder, Frank Steinicke

The Influence of Step Frequency on The Range of Perceptually Natural Visual Walking Speeds During Walking-In-Place and Treadmill Locomotion (Short paper)
Niels Christian Nilsson, Stefania Serafin, Rolf Nordahl

Displaying Shapes with Various Types of Surfaces using Visuo-Haptic Interaction (Long paper)
Yuki Ban, Takuji Narumi, Tomohiro Tanikawa, Michitaka Hirose

In Touch with the Remote World: Remote Collaboration with Augmented Reality Drawings and Virtual Navigation (Long paper)
Steffen Gauglitz, Benjamin Nuernberger, Matthew Turk, Tobias Hollerer

12:15 - **Announcement of Awards, Closing Remarks**
12:30 pm

5. Awards

A best paper award (sponsored by NVIDIA) and the best paper award (sponsored by Disney Research) were awarded to the following papers:

Best Paper Award: (NVIDIA Tesla N40)

Third Person View + Guidance For More Natural Motor Behaviour In Immersive Basketball Playing (Long paper)

Alexandra Covaci, Anne-Helene Olivier, Franck Multon

Best Paper Award, Runner up (Amazon 100 pound voucher)

Multiphase Surface Tracking With Explicit Contouring (Long paper), Xiaosheng Li, Xiaowei He, Xuehui Liu, Baoquan Liu, Enhua Wu

Best Poster Award (Amazon 100 pound voucher)

"A Portable Interface for Tangible Exploration of Volumetric Data" by Paul Issartel, Florimond Guéniat and Mehdi Ammi.

Among the accepted papers, outstanding papers were invited for publication in top journals including IEEE Transactions on Visualization and Computer Graphics, and IEEE Computer Graphics and Applications.

6. Keynote Speakers

We had two distinguished keynote speakers: Dr. Pushmeet Kohli from Microsoft Research Cambridge and Prof. Niloy J. Mitra from University College London. The abstract and the biography of the invited speakers are provided below.

Dr. Pushmeet Kohli (Microsoft Research Cambridge)

Title Understanding Reality for Generating Credible Augmentations

Abstract

The availability of new generations of imaging sensors (such as the Kinect) has given users the ability to accurately and efficiently capture the geometry of real world scenes. However, augmenting general scenes with virtual objects requires much more information about the 3D world. More specifically, to create credible augmentations, the AR system needs to complete the 3D geometry of the scene so that it is physically plausible, estimate the viewpoint of the user so that virtual objects can be rendered correctly, understand the semantic properties of different surfaces in the scene, and lastly but equally importantly, adapt the layout of virtual objects so that they are consistent with both the physical constraints imposed by the environment as well as consistent with each other. In this talk, I will discuss some of the work my colleagues and I have done in overcoming all these challenges.

Profile

Pushmeet Kohli is a senior research scientist in the Machine Learning and Perception group at Microsoft Research Cambridge. Pushmeet's research interests include Machine Learning, Computer Vision, Human-Computer Interfaces and Game Theory. In recent years, he has worked on the development and use of new depth sensors such as KINECT for the problems of human pose estimation, scene understanding and robotics. Pushmeet's papers have appeared in Computer Vision (ICCV, CVPR, ECCV, PAMI, IJCV, CVIU, BMVC, DAGM), Machine Learning, Robotics and AI (NIPS, ICML, AISTATS, AAAI, AAMAS, UAI, ISMAR), Computer Graphics (SIGGRAPH, Eurographics), and HCI (CHI, UIST) conferences. They have

won best paper awards in ICVGIP 2006, 2010, ECCV 2010, ISMAR 2011, WWW 2014 and TVX 2014. His research has also been the subject of a number of articles in popular media outlets such as Forbes, The Economic Times, New Scientist and MIT Technology Review.

Prof. Niloy J. Mitra (University College London)

Title: Capturing and Abstracting Man-made Environments

Abstract

Rapid advances in scanning technologies have enabled fast and affordable acquisition of man-made environments. While such data (e.g., SfM, LiDAR, depth scans) can easily be collected in massive volumes, they do not, in their raw form, provide a semantic understanding of the environments. This restricts the scope of subsequent interactions and VR tasks. On a positive note, such data provide a unique opportunity to discover and understand variability in shapes, both in terms of their geometry and their arrangements. In this talk, I will present different computational strategies to analyze and abstract raw scans to better understand the form and function of the world surrounding us. I will discuss the unifying ideas and methodology, while presenting some enabled applications.

Profile

Niloy J. Mitra is Professor of Geometry Processing at the Department of Computer Science at University College London (UCL). Earlier, he co-founded the Geometric Modeling and Visualization Center (GMSV) center at KAUST. He received his PhD degree and Masters in Electrical Engineering from Stanford University. His research interests include shape understanding, fabrication-aware design, geometric modeling, recreational art, and computer graphics in general. He received the ACM Siggraph Significant New Researcher Award in 2013 for his work on integrating form and function in 3D geometry

7. Sponsors

The conference was supported by the following organizations:

ACM
ACM SIGCHI
ACM SIGGRAPH
School of Informatics, University of Edinburgh
NVIDIA
Disney Research
SICSA
MIT Press

8. Summary

In summary, the conference has ended very successfully, with excellent paper presentations, great invited talks, and the newly introduced, attractive poster presentation program. We obtained a lot of positive feedbacks from the delegates. Coffee, lunch and dinner were fully provided to the delegates. The banquet was held at Playfeir Library in the Old College, University of Edinburgh, which was a magnificent experience to the delegates. There were several proposals for holding VRST next year - one is Beihang University in China, and the other is Leibniz Supercomputing Centre in Munich. The Steering Committee is currently considering the venue. We thank SICSA for supporting the VRST conference this year and we believe that it has brought a great opportunity to Scotland.