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Workshop on visual data capture

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Abstract:

Report on ETN-FPI workshop number 2 about “visual data capture”, organized at Fraunhofer IIS in Erlangen, Germany during 6th – 8th November 2017.

Keyword list:

Light field capture, multi camera array, movie production, data sets, special effects

Executive Summary

The workshop on visual data capture has been the first workshop performed within the ETN-FPI project. It gave the ESRs an understanding of what it means to apply the light field technology for movie production. This included both theoretical aspects, like use cases and open challenges, as well as practical knowhow, such as the use of professional post production software, the challenge to manage the huge data volumes and computation efforts, as well as the need for highly robust systems in order to be applicable for the daily use.

Based on this motivation, application oriented lectures have been held by three external presenters. Two of them are deeply linked in the movie creation business. Based on this knowhow, they were able to present the demands that end users will have on the future light field technologies. The third presentation established a link between computer graphics and light field, because in practice, they need to closely cooperate. Moreover, they share many fundamentals, but the link between these two research communities is not very strong. Hence an overview presentation has been organized to inform the ESRs about relevant technology from computer graphics.

For the practical sessions, the major goal has been to capture data sets that can be used later on in the research about light fields. Given that the technology is in an early stage and the overall time frame was short, this was a challenging task. Nevertheless, both video material and static light field content could be captured that is planned to be made available to the researchers.

The exchange of the gained knowhow has been achieved by two moderated lessons learned sessions. Here the three groups of ESRs that had been formed for the practical sessions had to present their results and difficulties, such that all ESRs could profit from this knowhow and avoid encountering similar difficulties.

Finally, two social events have been organized in order to strengthen the links between the ESR researchers. Given the geographical distances between the ETN-FPI partners, profiting from the presence of all ESRs has been considered important.

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Topic of the workshop

The workshop on visual data capture has been organized in the same week than the midterm review for the overall project. Both events have been taken place in the same location at the Fraunhofer Institute for Integrated Circuits.



Figure 1: Participants of the review meeting and the workshop

The program of the workshop is detailed in the following subsection.

Program of the workshop

Monday, 6th November 2017

09:00-12:30	Preparation of Review Meeting
12:30-13:30	Lunch in Fraunhofer canteen
13:30-13:45	Introduction of the program
13:45-14:30	Presentation How can computational imaging change film making? - A holistic analysis Dr. Johannes Steurer, ARRI
14:35-15:20	Presentation Expectations towards practical Lightfield technology Prof. Volker Helzle and Mr. Simon Spielmann, Animationsinstitut
15:20-15:45	Coffee break
15:45-17:00	Master class on light fields with Dr. Johannes Steurer, ARRI
18:00	Guided tour in Nuremberg
20:00	Dinner

Tuesday, 7th November 2017

09:30 – 10:15 Presentation
 Visual computing – A way to understand light fields
 Prof. Marc Stamminger

10:20 – 11:00 Safety instruction studio (including roboter)

11:30 – 12:30 Test shoot planning (three groups)

12:30 – 13:30 Lunch in Fraunhofer canteen

Group 1
 13:30 – 17:30 Capture Session 1
 Preparation of lessons learned

Groups 2 + 3
 13:30 – 15:15 Introduction to NUKE + Realception™
 15:45 – 17:30 Tutorial exercises + Preparation of lessons learned

All groups
 18:00 Departure to Social in Erlangen

Wednesday, 8th November 2017

09:30 – 10:00 Moderated lessons learned workshop

Group 1
 10:00 – 11:30 Introduction to NUKE + Realception™
 11:45 – 13:15 Tutorial exercises
 Preparation of lessons learned

Group 2
 10:00 – 13:15 Processing of data captured from Robot
 Preparation of lessons learned

Group 3
 10:00 – 13:15 Capture session 2

All groups
 13:15 – 14:15 Lunch in Fraunhofer canteen
 14:15 – 14:45 Moderated lessons learned workshop

Group 1
 14:45 – 18:15 Processing of data captured by group 3 in the morning
 Start to process video of group 2 as soon as it is available

Group 2
 14:45 – 18:15 Capture session 3

Group 3
 14:45 – 18:15 Processing of data captured by group 3 in the morning

All groups
 18:15 – 18:30 Closing session

Rationale of the workshop

The purpose of the workshop has been to familiarize the ESRs with the practices and challenges of light field capture for movie production. To this end, the workshop consisted of five central elements:

- Three presentations by external speakers, explaining the requirements, state of the art and practices in movie production. Moreover, a short introduction in computer generated imagery has been given to emphasize the link between the light field algorithms and computer graphics in order to make the ESRs familiar with related technological concepts.
- A master class on light field imaging in movie production, hold by Johannes Steurer from ARRI, and Prof. Helzle from the Animationsinstitut
- An introduction to a professional post production software, and the Realception™ plugins developed by Fraunhofer IIS for light field movie production
- Practical content capture and processing by the ESR students
- Moderated lessons learned workshops in order to spread the acquired knowledges among the ESRs

Organization of the workshop

While the lectures and the lessons learned workshops have been organized as a plenary attended by all workshop participants, the practical capture and processing sessions have been executed in three groups with five ESRs each, such that every ESR had to possibility to contribute to the practical work.

On the first two days, two social activities have been organized in order to foster the team spirit of the ESRs.

Lectures



Figure 2: Participants of lectures

Lecture 1: How can computational imaging change film making? - A holistic analysis

Instructor: Dr. Johannes Steurer, ARRI

Contents: Computational Imaging, use cases, light field cameras, depth key, 3D Vivant EU project, focus, matrix camera, ToF, the Scene EU project, temporal filtering, 360° surround view, volumetric capture

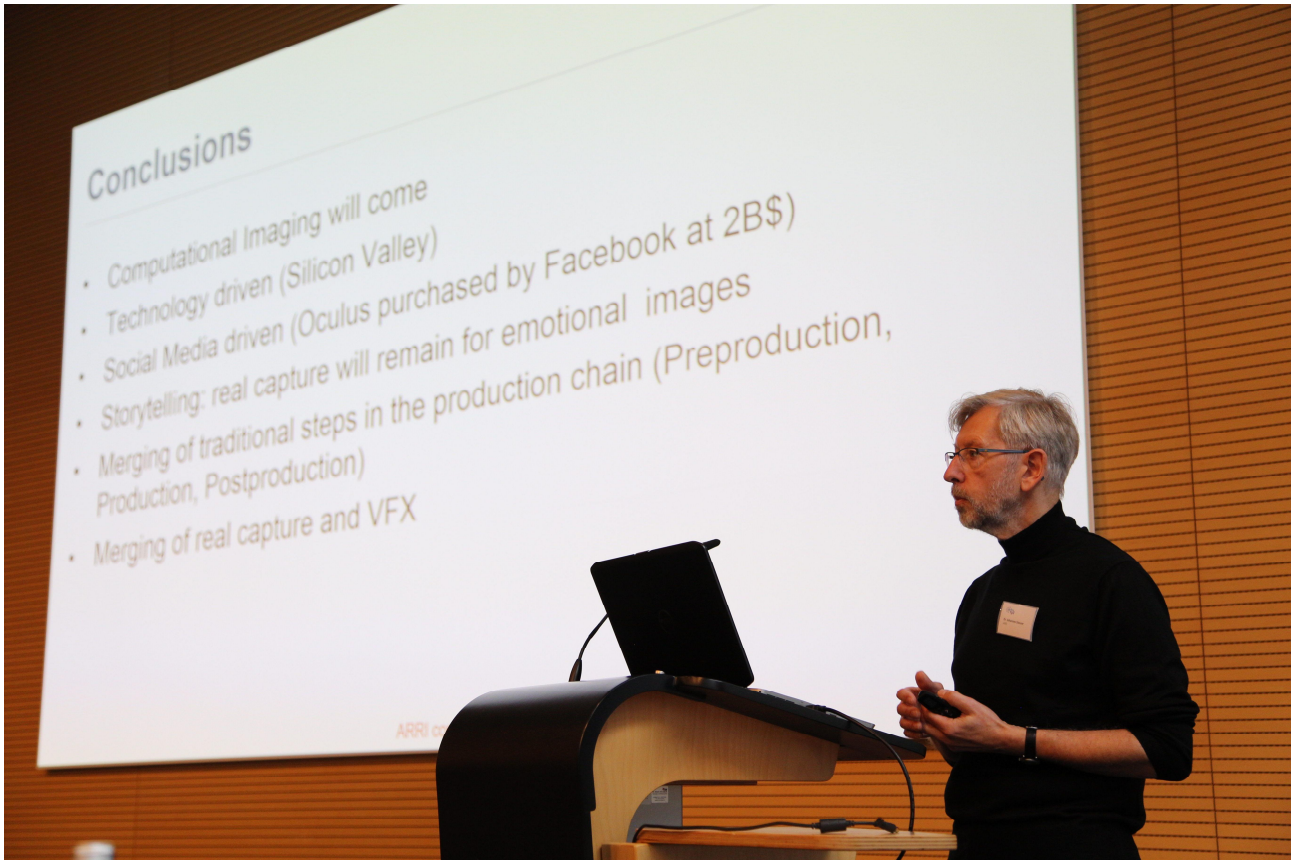


Figure 3: Lecture of Dr. Johannes Steurer, ARRI

Lecture 2: Expectations towards practical Lightfield technology

Instructor: Prof. Volker Helzle and Mr. Simon Spielmann, Animationsinstitut

Contents: chroma Key, camera tracking, match-move, lens and camera effects, set scanning and 3D reconstruction, 6DoF, shading, sensor fusion, EU project SAUCE,



Figure 4: Lecture of Prof. Volker Helzle and Mr. Simon Spielmann, Animationsinstitut

Lecture 3: Visual computing – A way to understand light fields

Instructor: Prof. Marc Stamminger, LGDV, University of Erlangen

Contents: Image synthesis, ray tracing, rasterization, shading, lighting, surface properties (diffuse, glossy, mirroring, sampling, antialiasing, depth of field, multiview reconstruction, kinect fusion, sign distance function, photogrammetry, BRDF



Figure 5: Lecture of Prof. Marc Stamminger

Master Class

Instructors: Dr. Johannes Steurer, ARRI and Prof. Volker Helzle, Animationsinstitut

Contents: What are the challenges to solve for making light fields practically applicable? What are the hopes and risks in this technology?

Form: Discussion with the ESR students.



Figure 6: Master class, realized by Dr. Johannes Steurer and Prof. Volker Helzle

Introduction to professional post production software and Realception™ Plugins

Instructor: Thorsten Wolf, Fraunhofer IIS

Contents: Basics in usage of NUKE (from the Foundry), nodes, graphical user interface, rectification, view rendering, disparity estimation, rendering, time line, special effects, pitfalls



Figure 7: Introduction to Realception™ plugins by Thorsten Wolf

Practical sessions about video capture and processing

Instructors: Matthias Ziegler, Fraunhofer IIS, Tobias Jaschke, Fraunhofer IIS, Andreas Schneider, Fraunhofer IIS, Jan-Micha Nietsch, Fraunhofer IIS

Contents: Capture light field material with two kinds of capture systems (video array with 4x2 cameras, Gantt-tree with DSLR camera)



Figure 8: Light field capture session

Lessons learned workshops

Moderator: Joachim Keinert, Fraunhofer IIS

Content: Summary on pitfalls, research challenges and achieved results



Figure 9: Lessons learned workshop

Feedback

Fourteen out of the fifteen ESRs attending the workshop responded to the feedback questionnaire handed out during the event. The ESRs rated the lectures with respect to quality of content (QoC) and quality of presentation (QoP) on a scale from 1 (very low) to 5 (very high), resulting in an average score of 4.0 for QoC and 4.2 for QoP. The differences between the three presentations were small. The standard deviation for all scores has been between 0.68 and 0.96. In the free comments, it has been recommended, to organize more detailed presentations, instead of limiting them to an overview.

The Exercises turned out to be more appreciated, with a QoC of 4.53 and a QoP of 4.43. The standard deviation was smaller (0.52-0.65), indicating a more similar evaluation by the ESRs.

According to the feedback, the venue was considered very well with a score of 4.8, and a standard deviation of 0.43. Also the social events could achieve a good scoring of 4.7.

In the free comments, the practical parts have been explicitly praised. The same holds for the organization and the support by the Fraunhofer IIS staff.

Dissemination

In order to distribute the activities of the workshop to the broad scientific community, a PR video has been created and published at

<http://www.full-parallax-imaging.eu/WS2/impressions/>

The latter also includes some representative photos.