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MA 3D Computer Animation

Integrating CG objects with a live action back plate - a personal enquiry into *Image Based Lighting*

Abstract

Integrating CG objects within a live action environment is a challenge which is becoming more commonplace in today's film industry. It is important that people planning a career in film understand the techniques used in CG integration so they can factor this in to the visual style from early stages of design. I have carried out some research in *Image based lighting* as a technique that can be used to recreate true-to-life light reflections seen on actual objects in an environment. Images are collected using a light probe, which are then unwrapped and mapped onto CG objects which have been placed into the scene. This results in colour matching between real and CG objects giving a more realistic and believable look to the whole image. My personal enquiry is based on implementing the process by integrating a CG tree with live footage of a forest scene.

Bibliography

Books:

Allen, D. and Connor, B., 2007. *Apple Pro Training Series: Encyclopedia of Visual Effects*. California: Peachpit Press.

I used the *Encyclopedia of Visual Effects* in order to research which method of integration would best suit my needs. Along with the advice of my PE tutor, Melania Fodritto, I found from this text that *Image Based Lighting* would be a suitable area of digital integration which I could look into.

Birn, J., 2006. *Digital Lighting and Rendering*. 2nd ed. California: New Riders.

Digital Lighting and Rendering was useful to me in the beginning for finding out about the techniques used in the digital world for emulating real lighting effects within a CG scene. It gave me an understanding of the traditional use of light in film and how this has been developed for use in 3D computer generated images.

Bloch, C., 2007. *The HDRI Handbook*. California: Rocky Nook Inc.

This text was useful in that it has very detailed information on HDRI lighting. This is the same technique used in *Image Based Lighting* and meant that I could be very informed going into the practice of gathering my images.

Journals:

I used the following journals as research in preparation for the collecting my images to use for my testing of the Image-Based Lighting technique.

Debevec, P.E., 1999. *Image-Based Modeling and Lighting*. California: University of California. Available from: <http://www.bournemouth.ac.uk/library/resources/ejournals.html> pp. 46-50 [Accessed 12 May 2010].

Debevec, P. 2002. *Image-Based Lighting*. California: USC Institute for Creative technologies. Available from: IEEE on <http://www.bournemouth.ac.uk/library/resources/ejournals.html>. 0272-1716/02, 26-34.

Debevec, P, McMillan, L., 2002. *Image-Based Modeling, Rendering and Lighting*. California: USC Institute for Creative technologies, Massachusetts: Massachusetts Institute of technology. Available from: IEEE on <http://www.bournemouth.ac.uk/library/resources/ejournals.html>. 0272-1716/02, 24-25. [Accessed 21 March 2010]. Dutre, P., Peers, P., 2002. *Accurate Image Based Re-lighting through Optimization*. K. U. Leuven: Department of Computer Science, K. U. Leuven. Available from: <http://www.bournemouth.ac.uk/library/resources/ejournals.html>. pp. 145. [Accessed 21 March 2010].

Neulander, I., *Image-Based Diffuse Lighting Using Visibility Maps*. Rhythm and Hues Studios. pp. 1. [Accessed 21 March 2010].

Tachi, T., *Full-Spectral Image-based Lighting with Skylight*. Tokyo: The University of Tokyo. Available from: <http://www.bournemouth.ac.uk/library/resources/ejournals.html>. [Accessed 21 March 2010].

Unger, J., Wrenninge, M., and Ollila, M., 2003. *Real-time Image Based Lighting in Software Using HDR Panoramas*. Sweden: NVIS, Linköping University, Sweden. Available from: <http://www.bournemouth.ac.uk/library/resources/ejournals.html>. [Accessed 21 March 2010].

Online tutorials:

I watched the following tutorials online in order to be better informed on the process and to find out how the process differs with other softwares.

Digital-tutors website; https://www.digitaltutors.com/09/my_account.php

Image Based Lighting [Accessed 10 May 2010]

Image-based lighting techniques [Accessed 10 May 2010]

Introduction to Mantra in Houdini - Image-Based Lighting [Accessed 10 May 2010]

Mental Ray with Image based lighting [Accessed 10 May 2010]

Mental Ray in XSI - Image-Based Lighting [Accessed 10 May 2010]

Understanding Image based lighting [Accessed 10 May 2010]

Using Final Gathering for image-based lighting [Accessed 10 May 2010]

Websites:

Macey, J., 2010. *Jon Macey Computer Animation Pages – Lighting Tools*. Bournemouth: National Centre for Computer Animation. Available from: <http://nccastaff.bmth.ac.uk/jmacey/Pipeline/lighting.html> [Accessed 12 May 2010].

Whitehurst, A., 2002. *HDRI The Cheap And Nasty Way*. London: Double Negative. Available from: http://www.andrew-whitehurst.net/hdri_tut.html [Accessed 21 March, 7 May and 13 May 2010].

Debevec, P., 2010. California: USC Institute for Creative technologies. Available from: <http://www.debevec.org/Research/LS/> [Accessed 13 May 2010].

DVD Tutorials:

Jackemuk, G., *Visual Effects Compositing Fundamentals*. [DVD] California: The Gnomon Workshop. Available from: Gnomon school of Visual Effects.

University Lecturer tutorials:

Fodritto, M., 2010. *Image Based Lighting*. Bournemouth: National Centre of Computer Animation. [Weekly meetings from March 25 – 12 May 2010].

Melania Fodritto shared her expertise with me which enabled me to focus on an area of digital effects which best suited my needs. She loaned me a HDRI ball and recommended a DE students for me to speak with which proved to be a huge help. She has also offered her assistance with this process in future projects.

Personal Enquiry academic team presentations:

Zia, R., 2010. *Personal Inquiry Presentation*. Bournemouth: National Centre of Computer Animation. [Presentation 1 May 2010].

Rehan Zia helped by sending me his presentation and providing me with a couple of journals by Paul Debevec, one of which I had already but one which I had not found on the library search site. He also provided me with a tutorial to watch as part of my research.

University Lectures – MA 3D Computer Animation:

Efstathiou, S., 2009. *Lighting Practice, HDRI*. Bournemouth: National Centre of Computer Animation. Available from <http://nccaplone/xsi/tutorials/lighting> [Accessed 21 March and 13 March 2010].

Student Assistance:

Baker, M., 2010. MA Digital Effects Student 2009/10.

Michael Baker helped me by instructing me how to download HDR Shop and use the software to unwrap my Spherical HDRI captured images. He also instructed me how to clean up the image for applying to my 3D environment.

Liu, Qianqian, MA 3D Computer Animation 2009/10.

Qianqian helped me by lending me her very new Nikon DSLR and tripod. I had used my own IXUS previously which does not quite match the quality of image produced by the Nikon.

Software:

HDR Shop, Photoshop, Softimage 2010.