UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SONY CORPORATION

Petitioner

Patent No. 7,477,284
Issue Date: Jan. 13, 2009
Title: SYSTEM AND METHOD FOR CAPTURING AND VIEWING STEREOSCOPIC PANORAMIC IMAGES

EXPERT DECLARATION OF TREVOR DARRELL

No. IPR2013-00327

I, Trevor Darrell, do hereby make the following declaration:

1. I am a Professor in Residence at the University of California, Berkeley in the department of Electrical Engineering and Computer Sciences, College of Engineering and have served in that capacity since 2011.
2. I am also the head of the Computer Vision Group at the International Computer Science Institute (a research organization affiliated with Berkley) and have served in that capacity since 2008.
3. I received my B.S.E. degree in Computer Science and Engineering from the University of Pennsylvania in 1988, received a M.S. degree from the Media Lab at the Massachusetts Institute of Technology ("MIT") in 1991 and received a Ph.D. from MIT in 1996.
4. I am an author of nearly two hundred publications in peer reviewed journals and conferences in computer vision and related fields. At Berkeley, I teach graduate level courses including CS 280 Computer Vision and CS 294 Object Activity Recognition Seminar. I have also given numerous lectures and attended many conferences on computer vision and related fields. A list of my publications and invited lectures can be found in the attached CV. *See* Sony-1115.
5. I submit this declaration in support of the Petition for *Inter Partes* Review of U.S. Pat. No. 7,477,284, No. IPR2013-00327. I have previously submitted a

declaration in support of the Petition for *Inter Partes* Review of U.S. Pat. No. 7,477,284, No. IPR2013-00219.

6. I have reviewed U.S. Pat. No. 7,477,284 (the "'284 Patent") as well as U.S. Pat. No. 6,665,003 (the "'003 Patent"), which is incorporated into the '284 Patent by reference.

7. Based upon my experience and education, I consider myself to be a person of at least ordinary skill in the field of technology disclosed by the '284 Patent, including the generation and display of stereoscopic images as well as stereoscopic panoramic images.

8. In 1998, a person with ordinary skill in the art with respect to the technology disclosed by the '284 Patent would have at least a Master of Science degree in Electrical Engineering, Computer Engineering, or Computer Science as well as two to three years of additional graduate level experience or related industry experience.

9. In preparing this declaration, I have reviewed the following publications:

    a. Certified English Translation of VRSJ Research Report including Yasuhiro Kawakita, Yoshitaka Hamaguchi, Akitoshi Tsukamoto, Toshihiko Miyazaki, *Generation of Panoramic Stereo Images from Movie Using Single Video Camera*, Kansai Laboratory Research & Development Group, OKI Electric Industry Co., Ltd. (Nov. 27, 1997) ("Kawakita");

b. Hiroshi Ishiguro, Masashi Yamamoto, and Saburo Tsuji, *Acquiring Omnidirectional Range Information*, SYSTEMS AND COMPUTERS IN JAPAN, Vol. 23, No. 4, 47-56 (1992) ("Ishiguro");

c. U.S. Pat. No. 1,422,527 ("Berger");

d. U.S. Pat. No. 5,737,491 ("Allen");

e. U.S. Pat. Pub. No. 2001/0010546 A1 ("Chen").

10. With respect to Kawakita:

a. Kawakita discloses a technique to generate stereoscopic panoramic images by excising slit images from images captured by a rotating camera and mosaicing the respective slit images together. In Section 1 of the paper, Kawakita also discusses creating a 2D panoramic image using center slit images.

b. A person of ordinary skill in the art reading Kawakita would understand that the processing steps disclosed by Kawakita would necessarily have been performed by a processor within a computer or workstation. The video imager described in Kawakita records frames of 320x240 pixels. Kawakita also describes digital processing steps including "template matching" and receiving "detection results" as part of the procedure for determining slit widths. It would have been necessary and obvious to employ a processor to perform these steps, especially in light of the

number of pixels being processed, which would be unfeasible to perform by hand.

c. In fact, virtually every imaging project to which I have contributed, including the nearly 200 listed in my CV, has employed a processor, such as, for example, within a computer or workstation.

d. A person of ordinary skill in the art reading the "Field Test" section of Kawakita would understand Kawakita to report that stereoscopic panoramic mosaic images generated using the technique described in the paper were displayed and that "the sense of depth was faithfully reproduced." Even if the report of stereoscopic viewing of the panoramic mosaic images were not included in Kawakita, a person ordinary skill in the art reading the remainder of Kawakita would understand that stereoscopic display of the panoramic mosaic images to be disclosed or, at least, obvious. Indeed, section 6 of Kawakita, entitled "Stereoscopic Viewing Using Depth Parallax Angle" describes adjustments to the relative positions of the panoramic mosaic images in order to display them for stereoscopic viewing.

e. A person of ordinary skill in the art reading Kawakita would understand that it would be preferable to miniaturize the image generation

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