UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SONY COMPUTER ENTERTAINMENT AMERICA LLC
Petitioner

v.

APLIX IP HOLDINGS CORPORATION
Patent Owner

Case No. IPR2015-00230
Patent 7,463,245

DECLARATION OF DR. GREGORY F. WELCH

I, Gregory F. Welch, hereby declare the following:

I. BACKGROUND AND QUALIFICATIONS

1. I have summarized in this section my educational background, career history, and other relevant qualifications. I have also attached a current version of my Curriculum Vitae as **Exhibit 1011**.

2. I am the Florida Hospital Endowed Chair in Healthcare Simulation at the University of Central Florida (UCF) with appointments in the College of Nursing, the Computer Science Division of the Department of Electrical Engineering and Computer Science, and the Institute for Simulation & Training. I am also an Adjunct Professor of Computer Science at the University of North Carolina at Chapel Hill (UNC), a Visiting Professor in the School of Information and Library Studies at University College Dublin (Ireland), and a Visiting Professor in the Graduate School of Media Design at Keio University (Japan).

3. In 1986 I received a B.S. degree in Electrical Technology from Purdue University (with Highest Distinction), in 1995 I received a M.S. in Computer Science from UNC, and in 1997 I received a Ph.D. in Computer Science from UNC.

4. Previously I have been a Research Professor at the University of North Carolina at Chapel Hill, a Senior Engineer at Northrop-Grumman's Defense Systems Division where I worked on the AN/ALQ-135 electronic countermeasures system for the U.S. Air Force F-15 Eagle, and a member of the technical staff of

NASA's Jet Propulsion Laboratory where I worked on the Voyager Spacecraft project.

5. My current research interests include human motion tracking systems, three-dimensional (3D) telepresence, projector-based graphics, computer vision and view synthesis, and medical applications of computers for training, assessment, and practice. I have co-authored over 100 peer-reviewed publications in these areas, and I am a co-inventor on multiple patents. I currently supervise over $2M in research funding (active grants at UCF and UNC), and am jointly responsible for over $23M in grants overall since 1996, from (for example) the Office of Naval Research (ONR), the National Science Foundation (NSF), The National Institutes of Health National Library of Medicine (NIH-NLM), the Defense Advanced Research Projects Agency (DARPA), the Department of Energy (DOE), and private companies—all involving multi-disciplinary and multi-institutional projects.

6. I have co-chaired major academic conferences (including IEEE ISMAR 2012 and Virtual Reality 2013), served on numerous program committees, co-chaired workshops, and serve as a peer reviewer for many conferences and journals. I serve on the editorial board of the *International Journal of Virtual Reality*, and I am an Associate Editor for the journal *Presence: Teleoperators and*

Virtual Environments, and an Associate Editor for the journal *Frontiers in Virtual Environments*.

7. I am a member of the IEEE Computer Society, the Association for Computing Machinery (ACM), the Southern Nursing Research Society (SNRS), the International Nursing Association for Clinical Simulation & Learning (INACSL), and the Society for Simulation in Healthcare (SSH).

8. My work in human interface systems and the associated the computer-based sensing (e.g., hardware, software, sources/sensors, signal processing, and algorithms) goes back at least to the early 1980s when I was an undergraduate at Purdue University, e.g., with the co-development of an environmentally aware "smart wheelchair" for children with Cerebral Palsy. Fellow student and co-developer James Williams and I received an "Outstanding Senior Design Project award for "The Easy Chair" in 1986. One of my core contributions to the wheelchair project was the development of a novel customizable touch pad to be used by the children to control the wheelchair. The touch pad was customizable to allow caregivers to design an interface that was tailored to each child and their unique (limited) affordances.

9. My work in computer-based sensing continued into the late 1980s and early 1990s when I worked at NASA's Jet Propulsion Laboratory (the Voyager Project) and Northrop-Grumman's Defense Systems Division (a radar jammer). In

particular in 1992 I attended graduate school at the University of North Carolina at Chapel Hill (UNC) where I studied/worked under the direction of Prof. Gary Bishop and others as a graduate student. My Ph.D. work, which I completed in 1996, introduced a new Kalman filter-based Single Constraint at a Time (SCAAT) approach to sensing for applications such as human motion tracking in Virtual Environments. It was one of the critical aspects of the HiBall system for tracking heads, hands, and user interface devices. This system was commercialized by 3rdTech and sold until approximately 2012.

10. While a research faculty member at UNC from 1996-2011, I co-led/led the Tracker Research Group, the 3D Computer Vision Group, and the Office of the Future Group. This includes conception and acquisition of contracts and grants; leading the subsequent research efforts; advising students; serving on Ph.D. committees; etc. In the mid-to-late 1990s I co-developed methods for tracking human motion by combining measurements from cameras that recognize and track natural features in the environment, with inertial and other sensing devices (accelerometers and gyros). Along the way I have developed human interface devices for research (e.g., physician interfaces for medical visualization and telepresence), and supervised the development of human interface devices by students in a Virtual Worlds course at UNC.

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