IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

In the *Inter Partes* Review of:)
)
U.S. Patent No.: 10,413,832)
)
)
For: GAME CONTROL METHOD,)
GAME SERVER, AND PROGRAM)
)
)

Mail Stop Patent Board

Patent Trial and Appeal Board

P.O. Box 1450

Alexandria, VA 22313-1450

**DECLARATION OF RAVIN BALAKRISHNAN, Ph.D.
IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 10,413,832**

I, Ravin Balakrishnan, Ph.D., declare as follows:

I. INTRODUCTION

1. I have been asked by the party requesting this review, Supercell Oy ("Petitioner"), to provide my expert opinions in support of the above-captioned petition for *inter partes* review of U.S. Patent No. 10,413,832 (the "'832 patent"), challenging the patentability of claims 1-15 of the '832 patent.

2. I currently hold the opinions set forth in this declaration.

3. In summary, it is my opinion that the references cited below render obvious claims 1-15 of the '832 patent. My detailed opinions on the claims are set forth below.

II. BACKGROUND AND QUALIFICATIONS

4. I am currently a tenured Full Professor of Computer Science in the Department of Computer Science at the University of Toronto. I joined the faculty at the University in 2001, was granted tenure in 2006, and served as Chair of my Department from 2015 to 2019. From 2006-2016, I held the Canada Research Chair in Human-Centered Interfaces in the Department of Computer Science.

5. I earned a B.Sc. in Computer Science from the University of New Brunswick in 1993, an M.Sc. in Computer Science in 1997 and a Ph.D. in Computer Science in 2001 both from the University of Toronto. Since receiving my Ph.D., I have been a member of the faculty of the Department of Computer Science at the

University of Toronto where my research has focused on human computer interaction ("HCI"), including the development of user interface technologies to improve HCI on a variety of computational platforms and application areas including mobile devices, video games, large displays, 3D displays, virtual and augmented reality technologies.

6.   In conjunction with my professorship, I serve as Co-Director of the Dynamic Graphics Project Laboratory at the University of Toronto that has twelve faculty members and roughly 50 graduate students and postdoctoral researchers working on various aspects of user interface technologies, display technologies, computer graphics, interactive technologies and virtual environments. Tech transfer of research to industry from this lab in recent years has resulted in several spin-off companies, including ones focused on 3D user interfaces, medical data visualization, virtual reality, and 3D architectural visualization and interaction.

7.   As part of my professorial duties, I teach and supervise graduate students and postdoctoral fellows in their research work. To date, 27 research M.Sc. students, 15 Ph.D. students, and 8 postdoctoral fellows have completed their research training under my guidance. Their research has led to theses and peer reviewed publications in over a broad range of topics covering interactive computing and user interfaces for multiple applications and technology platforms. I have taught courses covering computing topics including interactive computing, human-

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computer interaction, and information systems and design, as well as courses covering game development topics including user interfaces for games including on virtual reality and augmented reality systems.

8.   I have published over 140 refereed publications in peer-reviewed journals. I have further presented numerous conference abstracts, posters, talks, and demonstrations in my field. My work has been cited more than 17,000 times across a spectrum of high-impact publications, and my current h-index score is 76, which is an indication of the significant impact of my research on scholarly literature in the field of Computer Science.

9.   I have received major awards and honors in my field. For example, in 2007, I received an Alfred P. Sloan Research Fellowship. In 2011, I was elected into the Association for Computing Machinery's Computer Human Interaction Academy, which is an honorary group consisting of researchers who have made extensive contributions to the study of HCI and who have led the shaping of the HCI field. The stated criteria for being elected into the Association for Computing Machinery's Computer Human Interaction Academy are: (1) cumulative contributions in the field; (2) impact on the field through development of new research directions and/or innovations; and (3) influence on the work of others.

10.   I have been a co-founder on a number of start-ups focusing on human-computer interfaces, including Bump Technologies (acquired by Google in 2010)

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which developed a physically realistic desktop user interface system, Arcestra (formerly Sketch2 Corp) which developed software for designing 3D building layouts, and Conceptualiz which develops surgical planning technology.

11.   My research at the University of Toronto has involved nearly every broad aspect of human-computer interaction and data visualization. For instance, I have done significant work in the areas of input devices, displays, sensing technologies, interfaces to small and/or mobile computers, interfaces to displays of the future, and interaction techniques, including touch and multi-touch, gestural, sketching, and multi degree-of-freedom interactions. As another example, I have done work in the evaluation of user interfaces, including associated metrics and predictive models of human performance.

12.   In addition to my research at the University of Toronto, I have collaborated with researchers at leading institutions worldwide. For example, I have been a visiting professor at Laboratoire de Recherche en Informatique (LRI) at the Université Paris-Sud, France. Additionally, I have been a visiting researcher at several industrial laboratories, including: (1) HPLabs, (2) Mitsubishi Electric Research Laboratories (MERL), and (3) Microsoft Research Labs. At those companies, my work generally focused on developing new user interface techniques for a variety of technology platforms. Prior to becoming a professor, during my MSc and PhD studies, I was also concurrently a part-time researcher at Alias|wavefront

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