UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

ROKU, INC.,
Petitioner,

v.

UNIVERSAL ELECTRONICS, INC.,
Patent Owner.

Case IPR2019-01615
Patent No. 9,716,853

DECLARATION OF DR. DON TURNBULL IN SUPPORT
OF PATENT OWNER'S RESPONSE

I, Dr. Don Turnbull, declare as follows:

I.   INTRODUCTION

1.   My name is Don Turnbull. I have been retained by counsel for Patent Owner Universal Electronics Inc. ("Patent Owner" or "UEI") to provide my independent analysis regarding the validity of claims 1, 3, 5, and 7 ("Challenged Claims") of U.S. Patent No. 9,716,853 ("the '853 patent").

A.   My Background, Qualifications, Publications, and Testimony

2.   My background, qualifications, publications, and any prior testimony are fully set forth in my curriculum vitae, which is attached hereto as **Exhibit 1**.

3.   I am an expert in software design and architecture, including networked systems, with 30 years of research and development experience. My research and development endeavors cover various technologies related to multimedia information systems; human-computer interaction; interface design; user behavioral data collection, analysis and modeling; mobile (handheld) computing; and multimedia content organization and display, some of which are subject to patent and trade-secret protection.

4.   My current work centers generally on software research and design in the areas of information systems. This work includes consumer and enterprise applications such as content management systems, mobile technologies, recommendation systems, personalization, analytics applications, search tools and eCommerce platforms. I also research and invent solutions related to data mining and data science, collecting network and device usage data, software architecture and interaction design.

5.   I am involved in helping software companies, from small startups to large corporations, create new technologies and applications. To advise these companies, I research and

monitor academic and industry technology developments to keep up-to-date regarding advances in the field. I am also aware of the history of software development from my professional and academic experience over the past 30 plus years.

6.   Academically, I received a B.A. in General Studies (in "Knowledge Engineering," *i.e.*, computer science, cognitive psychology, and philosophy) from The University of Texas at Arlington in 1988. In 1995, I earned an M.S. in Information Design and Technology from the Georgia Institute of Technology where my concentration was on Internet and Web systems in their very early days with a focus on interactive multimedia systems and interfaces. My work at Georgia Tech included creating digital media, researching Web server technology, building Web sites, designing Web-based content management systems, content management methodologies, and information retrieval systems. In 2002, I received a Ph.D. in Information Studies from the University of Toronto where my research centered on information systems user behavior data collection, analysis and recommendation algorithms.

7.   From 2002-2009, I was an Assistant Professor at the School of Information at The University of Texas at Austin where I created and taught a variety of graduate-level courses including: Information Architecture and Web Design; Web Information Retrieval, Evaluation & Design; the Semantic Web; Information System Analytics; and Web Information System Design and Knowledge Management Systems. As faculty, principal investigator, and research team director, my areas of exploration included designing information system interfaces and architectures; large-scale data mining and algorithms (including Web use data for personalization); techniques for interface design for multimedia access; mobile interaction techniques; Web content classification; and the design of Web search engines, as well as studying their use.

8.   While an Assistant Professor, I formed and managed a number of research projects. These projects included information architecture and design for multimedia Web pages and Web sites; a survey of the history of technologies in Web browsers (including protocols, extensions and scripting functionality); a multimedia content classification system; and a set of methods for content analysis and topic distillation. I also advised graduate students and coordinated information technology research and development including Semantic Web applications, mobile information system prototypes and server architectures, user understanding of digital content manipulation, Web accessibility evaluation, Web link mining and analysis, information architecture design methodologies, and advertising methods and platforms.

9.   Before I was an Assistant Professor, I worked many years in a variety of roles in software research and development, including as a software developer (programmer) and designer, software engineering methodologist and a technology systems architect. From 1994 through 2000, my own work was primarily focused on researching, designing and building Internet information systems and applications. I was also a researcher and a Lead Technical Architect at IBM where I worked on building an Internet client/server platform for a multimedia client application combined with a database-driven Web site—the IBM-WorldBook Multimedia Encyclopedia. I also contributed to designs and advised on numerous other ongoing Internet-focused projects at IBM, including Web site development tools for eCommerce small business Web sites, digital video control interfaces, large enterprise (intranet) Web sites including portals, as well as the foundations for a usability practice at IBM to evaluate IBM software and consumer-based applications.

10.   Earlier, before the Web era, I was a software engineering methodologist and software developer creating Macintosh, Microsoft Windows, and IBM OS/2 software for building client/server applications that worked with (relational) databases over networks, which proved to

be much of the supporting technology for Internet and Web applications. This included programming and working as a database administrator and using early Internet networking tools. I also designed and built early hypertext (SGML) authoring tools, which led to a more commercial use of the Internet beginning in the early 1990's.

11.   My academic knowledge and professional experience also include network communication protocols, including Wi-Fi, HDMI, infrared and FireWire as well as the configuration and control of consumer electronic devices incorporating multimedia control interfaces.

12.   I am also the author of numerous academic publications including: a textbook on Web-based information systems use and knowledge work; articles on human-computer interaction design; personalization for Web-information-retrieval and recommender systems; and numerous definitive works on information-architecture (Web site) methodologies, designs, and implementations. In addition, I am the named inventor on at least one United States patent focused on content delivery and personalization.

B.   Compensation

13.   I am not, and never have been, an employee of UEI. I am not receiving compensation for this declaration beyond my normal hourly fees based on my time actually spent analyzing and documenting my opinions herein on the '853 patent, the asserted prior art publications cited in this declaration and in the Petition, and the issues related thereto. My compensation is not related to the outcome of this proceeding, and I will not receive any additional compensation based on the outcome of any IPR or other proceeding involving the '853 patent.

II.   MATERIALS CONSIDERED

14.   I have reviewed the '853 patent, including the Challenged Claims, and its prosecution history.

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