UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Apple Inc.,
Petitioner

v.

California Institute of Technology,
Patent Owner.

Case IPR2017-219

DECLARATION OF BRENDAN FREY, PH.D.

I, Brendan Frey, Ph.D., declare as follows:

1. My name is Brendan Frey

2. I received a B.Sc. with Honors in Electrical Engineering from the University of Calgary in 1990, a M.Sc. in Electrical and Computer Engineering from the University of Manitoba in 1993, and a Ph.D. in Electrical and Computer Engineering from the University of Toronto in 1997. Since July 2001, I have been at the University of Toronto, where I am a Professor of Electrical and Computer Engineering and Computer Science. In 2014, I founded Deep Genomics and am currently its CEO.

3. During my career I have conducted research in the areas of graphical models, error-correcting coding, machine learning, genome biology and computer vision. I have authored more than 200 publications and am named as an inventor on at least nine patents issued by the U.S. Patent and Trademark Office.

4. I have received a number of honors and awards for the research I have conducted. In 2008, I was named a Fellow of the Institute for Electrical and Electronic Engineers (IEEE), an honor given to a person with an "extraordinary record or accomplishments" in the field of electrical engineering. In 2009, I was named a Fellow of the American Association for the Advancement of Science (AAAS), an honor that recognizes "efforts on behalf of the advancement of science or its applications which are scientifically or socially distinguished." In 2015, I was

elected as a Fellow of the Royal Society of Canada, the most distinguished association of scientists and engineers in Canada.

5. In 2009, I was awarded a Steacie Fellowship for my work on the theory and implementation of artificial and natural mechanisms for inferring patterns from data. The Steacie Fellowship is awarded by the Natural Sciences and Engineering Research Council of Canada (NSERC) to "outstanding and highly promising scientists and engineers" who are faculty members of Canadian universities. In 2011, I received the NSERC's John C. Polanyi Award, in recognition of my research on inferring genetic codes embedded in DNA that direct activities within cells.

6. Throughout my career, I have received funding from various governmental agencies to support my research, including the Natural Sciences and Engineering Research Council of Canada, the Canadian Institutes of Health Research, and the Canadian Institute for Advanced Research.

7. I have authored a book entitled "Graphical Models for Machine Learning and Digital Communication." In addition, I have authored or co-authored nearly 181 articles in peer-reviewed journals, conference proceedings, texts, industry trade publications, and monographs.

8. I have reviewed the specification and claims of U.S. Patent No. 7,116,710 (the "'710 patent"; Exhibit 1001 of IPR2017-210 and Exhibit 1201 of

IPR2017-00219). I have been informed that the '710 patent claims priority to a provisional application filed on May 18, 2000, and to U.S. application Ser. No. 09/922,852, filed on Aug. 18, 2000.

9. I was an active contributor and collaborator in the community that included some of the inventors of the '710 patent and the '032; '781; and '833 patents, which descend from the '710 patent, around the time of the alleged invention. In particular, I attended talks given by Dr. Robert McEliece and Dr. McEliece attended talks that I presented around the time of the alleged invention. These talks included the 1998 and 1999 Allerton Conferences held by the University of Illinois Urbana-Champaign in Allerton, Illinois, as well as the 2000 Brest 2nd International Symposium on Turbocodes and Related Topics and the 2000 Sorrento ISIT conferences. Dr. McEliece, Dr. MacKay, and I attended and made presentations at the 1999 Institutive for Mathematics and its Applications (IMA) 1999 Summer Program: Codes, Systems and Graphical Models, which was held at the University of Minnesota on August 2-13, 1999.

10. I am being compensated at my normal consulting rate of $950 per hour for my work.

11. My compensation is not dependent on and in no way affects the substance of my statements in this Declaration.

12. I have no financial interest in Petitioners. I similarly have no financial interest in the '710 patent.

13. I have reviewed Exhibit 1002 of IPR2017-210 and Exhibit 1202 of IPR2017-219. Those exhibits are true, complete and correct copies of a paper I drafted that I presented at the 1999 Allerton Conference on Communications, Control and Computing, and Computing in Allerton, Illinois ("1999 Allerton Conference") in September 1999, and which was published in the subsequent conference proceedings.

14. Beginning in 1998, I collaborated with Dr. David MacKay to show that turbocodes could benefit from being made irregular codes in a similar way that Michael Luby, Michael Mitzenmacher, M. Amin Shokrollahi, Daniel A. Spielman, and others had adapted LDPC codes to be "irregular." I used software that I had written to simulate and test various irregular turbocodes.

15. The result of my collaboration with Dr. MacKay was the presentation at the 1999 Allerton Conference. The 1999 Allerton Conference was held September 22-24, 1999. The 1999 Allerton Conference was open to the public for attendance. Any person who wanted to attend and was willing to pay the attendance fee could attend the 1999 Allerton Conference. The 1999 Allerton Conference was considered one of two primary conferences on the topic of iterative decoding during the time, and many key people from the field attended

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