

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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LIBERTY MUTUAL INSURANCE CO.  
Petitioner

v.

PROGRESSIVE CASUALTY INSURANCE CO.  
Patent Owner

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Case CBM2012-00002 (JL)  
Patent 6,064,970

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**Declaration of Dr. Mark Ehsani**

Progressive Exhibit 2016  
Liberty Mutual v. Progressive  
CBM 2012-00002

## **Declaration of Dr. Mark Ehsani**

I, Dr. Mark Ehsani, hereby declare under penalty of perjury:

### Scope of Assignment

- 1) I was retained by the law firm of Jones Day, on behalf of the Progressive Casualty Insurance Company (“Progressive”), to render opinions regarding fuzzy logic technology.
- 2) All of my statements and opinions herein are based on my training and education as a Ph.D. in Electrical Engineering and as a Professor of Electrical Engineering and Director of the Advanced Vehicle Systems Research Program at Texas A&M, and on my work experience as a research engineer and as an industry consultant to over 60 domestic and international companies and agencies.
- 3) My retention agreement with Jones Day calls for me to be compensated at my normal rate of \$575 per hour, inclusive of any third party expert service fees, plus out-of-pocket travel expenses.

### Qualifications

- 4) I am a Professor of electrical engineering and the founding Director of Advanced Vehicle Systems Research Program and the Power Electronics and Motor Drives Laboratory at Texas A&M University. I have worked as a professor and lecturer at Texas A&M University for 32 years. Prior to this, from 1974 to 1977, I worked as a research engineer at the Fusion Research Center, University of Texas, and from 1977 to 1981, I worked as a resident research associate at the Argonne National Laboratory, Argonne, Illinois. During my time at the Argonne National Laboratory, I was also performing doctoral work at the University of Wisconsin-Madison in

energy systems and control systems. My current research work is in power electronics, motor drives, vehicle electronics, and hybrid vehicles and their control systems. I have also performed research work in power electronics and motor drives with regard to applications such as wind power, space systems, military systems, power and energy storage, and consumer products, among others. I have received grants of over \$16,000,000 for funded research since 1981. I am a consultant to over 60 domestic and international companies and agencies.

- 5) I received a Doctorate of Philosophy in electrical engineering from the University of Wisconsin-Madison in 1981. Prior to this, I received B.S. and M.S. degrees from the University of Texas at Austin in 1973 and 1974, respectively. I was the recipient of the Prize Paper Awards in Static Power Converters and Motor Drives at the IEEE Industry Applications Society 1985, 1987, and 1992 Annual Meetings. In 1984, I was named the Outstanding Young Engineer of the Year by the Brazos chapter of the Texas Society of Professional Engineers.
- 6) In 1992, I was named the Halliburton Professor in the College of Engineering at Texas A&M University. In 1994, I was also named the Dresser Industries Professor at Texas A&M University. In 2001, I was selected for the Ruth & William Neely / Dow Chemical Faculty Fellow of the College of Engineering for 2001-2002, for "contributions to the Engineering Program at Texas A&M, including classroom instruction, scholarly activities, and professional service." In 2003, I was selected for the BP Amoco Faculty Award for Teaching Excellence in the College of Engineering. I was also selected for the IEEE Vehicular Society 2001 Avant Garde Award for "Contributions to the theory and design of hybrid electric vehicles." In 2003, I was selected for the IEEE Undergraduate

Teaching Award for “outstanding contributions to advanced curriculum development and teaching of power electronics and drives.” In 2004, I was elected to the Robert M. Kennedy endowed Chair in Electrical Engineering at Texas A&M University. In 2005, I was elected as a Fellow of the Society of Automotive Engineers (SAE).

- 7) I have been a member of the IEEE Power Electronics Society (PELS) AdCom, past Chairman of the PELS Educational Affairs Committee, past Chairman of the IEEE-IAS Industrial Power Converter Committee, and past chairman of the IEEE Myron Zucker Student-Faculty Grant program. I was the General Chair of the IEEE Power Electronics Specialist Conference for 1990. I am the founder of the IEEE Vehicle Power and Propulsion Conference, the founding chairman of the IEEE Vehicular Technology Society Vehicle Power and Propulsion Committee, and chairman of Convergence Fellowship Committees. In 2002, I was elected to the Board of Governors of the IEEE Vehicular Technology Society. I also serve on the editorial board of several technical journals and am the associate editor of IEEE Transactions on Industrial Electronics and IEEE Transactions on Vehicular Technology.
- 8) I am a Fellow of IEEE, an IEEE Industrial Electronics Society and Vehicular Technology Society Distinguished Speaker, and an IEEE Industry Applications Society and Power Engineering Society Distinguished Lecturer. I am also a registered professional engineer in the State of Texas.
- 9) I am an author on over 350 publications in pulsed-power supplies, high-voltage engineering, power electronics, motor drives, and advanced vehicle systems. I am a co-author of 16 books on power electronics, motor drives, and advanced vehicle systems, including “Vehicular Electric Power

Systems,” Marcel Dekker, Inc., 2003, and “Modern Electric Hybrid Vehicles and Fuel Cell Vehicles – Fundamentals, Theory, and Design,” CRC Press, 2004. I have over 30 granted or pending United States and European Union patents.

10) In my work, I have used fuzzy logic-type algorithms for a variety of functions (*e.g.*, to perform real-time vehicle data acquisition, logging, and analysis for driver-specific drive cycle analysis). Some of my work with computer and fuzzy logic-type algorithms is reflected in my books and research publications, including, for example, the following:

- J. P. Johnson, K. M. Rahman, and M. Ehsani, “Application of a Clustering Adaptive Fuzzy Logic Controller in a Brushless DC Drive,” IEEE-IECON’97, New Orleans, LA, November 1997, pp. 1001-1005.
- Zhiqiang Xu and Mehrdad Ehsani, “Reconstruction of Effective Wind Speed for Fixed-Speed Wind Turbines Based On Frequency Data Fusion,” Canadian Conference in Electrical and Computer Engineering, Calgary, Canada, September, 2010.
- Short Cycle Time Design of Advanced Motor Drives by the Real Time Simulation and Hardware in the Loop technologies, a two day short course offered to the automotive industry in Detroit, Michigan, Nov. 3-4, 2003.
- M. Ehsani, M. Masten, and I. Panahi, “Stiff System Control: A New Concept in Real Time Control,” Invited Paper at American Control Conference, San Diego, CA, May 1999.
- Short Cycle Time Design of Advanced Motor Drives by the Real Time Simulation and Hardware in the Loop Technologies, a two

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