UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AXON ENTERPRISE, INC.

Petitioner

v.

DIGITAL ALLY, INC.

Patent Owner

Case PGR2018-00052

Patent 9,712,730

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DECLARATION OF DR. VIJAY K. MADISETTI

I, Vijay K. Madisetti, Ph.D., hereby declare the following:

I. INTRODUCTION

1. I, Vijay K. Madisetti, Ph.D., have been retained by counsel for Digital Ally, Inc. ("Patent Owner") as a technical expert in the above-captioned case. Specifically, I have been asked to render certain opinions in regards to the Preliminary Patent Owner Response with respect to U.S. Patent No. 9,712,730 ("the '730 Patent") in response to the PGR Petition ("the Petition") submitted by Axon Enterprises Inc. ("Petitioner"). I understand that the Petitioner has challenged claims 1-24 and that Patent Owner has disclaimed claims 1-7, 9-14, and 22-24. I further understand that these disclaimed claims will not be a part of any proceeding resulting from the Petition. As such, I understand that, for the purposes of these proceedings, the Challenged claims are therefore 8 and 15-21. My opinions are limited to those Challenged Claims.

2. In reaching my opinions in this matter, I have reviewed the following materials:

- Petition For Post-Grant Review of U.S. Patent No. 9,712,730 (Paper 1)
- U.S. Patent No. 9,712,730 B2 (Ex. 1001)
- U.S. Provisional Patent Application No. 61/707,326 (Ex. 1010)
- U.S. Provisional Patent Application No. 61/707,348 (Ex. 1011)

- Declaration of Kurtis P. Keller (Ex. 1028)
- U.S. Patent Application Publication No. 2009/00276708 A1 to Smith, *et al.* (Ex. 1012)
- International Patent Application Publication No. 2012/037139 A2 to O'Donnell, *et al.* (Ex. 1014)
- U.S. Patent Application Publication No. 2009/0002491 A1 to Haler (Ex. 1015)
- U.S. Patent Application Publication No. 2011/0018998 A1 to Guzik (Ex. 1016)
- U.S. Patent Application Publication No. 2011/0098924 A1 to Balardeta *et al*. (Ex. 1017)
- U.S. Patent No. 6,563,532 B1 to Strub *et al.* (Ex. 1012)
- A Wayback Machine capture of Apple's iPhone Announcement (Ex. 2002)
- A copy of Google's Announcement of the first Android smartphone (Ex. 2003)
- Portions of Newton's Telecom Dictionary, 19th Ed. (Ex. 2004)
- A page from the Website of the Bluetooth™ SIG describing the radio characteristics of Bluetooth Radios (Ex. 2005)
- Portions of Restoration of Motion Picture Film (Ex. 2006)

II. QUALIFICATIONS

3. My qualifications to testify about the patent-in-suit, relevant technology, and the prior art are set forth in my curriculum vitae ("CV"), which is attached hereto as Appendix 1. My CV includes my educational background and work history.

4. Briefly, I have over thirty years of experience as an electrical and computer engineer in industry, education, and consulting. I have served as an expert witness in intellectual property cases and other matters. A list of my prior testimony is included in my CV attached as Appendix 1.

5. I obtained my Ph.D. in Electrical Engineering and Computer Science at the University of California, Berkeley, in 1989. I received the Demetri Angelakos Outstanding Graduate Student Award from the University of California, Berkeley and the IEEE/ACM Ira M. Kay Memorial Paper Prize in 1989.

6. I joined Georgia Tech in the fall of 1989 and am now a tenured Professor in Electrical and Computer Engineering. I have been active in the areas of wireless communications, digital signal processing, integrated circuit design (analog & digital), software engineering, system-level design methodologies and tools, and software systems. I have been the principal investigator ("PI") or co-PI in several active research programs in these areas,

including DARPA's Rapid Prototyping of Application Specific Signal Processors, the State of Georgia's Yamacraw Initiative, the United States Army's Federated Sensors Laboratory Program, and the United States Air Force Electronics Parts Obsolescence Initiative. I have received an IBM Faculty Award and NSF's Research Initiation Award. I have been awarded the 2006 Frederick Emmons Terman Medal by the American Society of Engineering Education for contributions to Electrical Engineering, including authoring a widely used textbook in the design of VLSI digital signal processors.

7. I have created and taught undergraduate and graduate courses in hardware and software design for signal processing and wireless communication circuits at Georgia Tech for the past twenty years.

8. I have been an active consultant to industry and various research laboratories (including Massachusetts Institute of Technology Lincoln Labs and Johns Hopkins University Applied Physics Laboratory). I have founded three companies in the areas of embedded software, military chipsets involving imaging technology, and wireless communications. I have supervised the Ph.D. dissertations of over twenty engineers in the areas of computer engineering, signal processing, communications, rapid prototyping, and system-level design methodology, of which five have resulted in thesis prizes or paper awards.

9. My consulting work for MIT Lincoln Labs involved high resolution imaging for defense applications, where I worked in the area of prototyping complex and specialized computing systems. My consulting work for the Johns Hopkins Applied Physics Lab ("APL") mainly involved localization of objects in image fields, where I worked on identifying targets in video and other sensor fields and identifying computer architectures and circuits for power and space-efficient designs.

10. I have developed wireless baseband and protocol stack software and assembly code for a leading telecommunications handset vendor that focused on efficient realization of speech codecs and echo-cancellation. My work in this regard included creation of software code, and analysis and revision of existing software code. This work spanned approximately three years of industry work between 2000 - 2004.

11. The first of the companies I founded, VP Technologies, offers products in the area of semiconductor integrated circuits, including building computing systems for imaging systems for helicopters for the United States Air Force. I remain a director of VP Technologies. The second of these companies, Soft Networks, LLC, offers software for multimedia and wireless computing platforms, including the development of a set-top box for Intel that decodes MPEG-2 video streams and imaging codes for multimedia

phones. The technology involved with the design, development, and implementation of the Intel set-top box included parsing the bit streams, decoding communications protocols, extracting image and video data, and then processing for subsequent display or storage. The third of these companies, Elastic Video, uses region of interest based video encoding or decoding for capturing high quality video at very low bit rates, with primary application for wireless video systems.

12. I have been elected a Fellow of the IEEE, for contributions to embedded computing systems. The Fellow is the highest grade of membership of the IEEE, a world professional body consisting of over 300,000 electrical and electronics engineers, with only one-tenth of one percent (0.1%) of the IEEE membership being elected to the Fellow grade each year. Election to Fellow is based upon votes cast by existing Fellows in IEEE.

13. I have authored or co-authored several books, including VLSI Digital Signal Processors (IEEE Press 1995) and the Digital Signal Processing Handbook (CRC Press, 1998). I am also Editor of the three-volume DSP Handbook set: Volume 1: Digital Signal Processing Fundamentals, Volume 2: Video, Speech, and Audio Signal Processing and Associated Standards, and Volume 3: Wireless, Networking, Radar, Sensory Array Processing, and Nonlinear Signal Processing, published in 2010 by CRC Press, Boca Raton,

Florida. I have also authored papers on control circuits related to control of electrical motors and generators.

14. I have designed several specialized computer and communication systems over the past two decades at Georgia Tech for tasks such as wireless audio and video processing and protocol processing for portable platforms, such as cell phones and PDAs. I have worked on designing systems that are efficient from performance, size, weight, area, and thermal considerations. I have developed courses and classes for the industry on these topics, and many of my lectures in advanced computer system design, developed under the sponsorship of the United States Department of Defense in the late 1990s, are available for educational use at "http://www.eda.org/rassp" and have been used by several U.S. and international universities as part of their course work. Some of my recent publications in the area of design of wireless communications systems and associated protocols are listed in Exhibit A.

15. I am knowledgeable and familiar with standards related to the wireless and telecommunications systems industry, and as shown in Exhibit A, some of my papers describe the application of these standards in optimizing the design and testing of these systems. I am also knowledgeable and familiar with microprocessor architecture and associated software and firmware design for

wireless and telecommunications terminals and Base Stations. I am also Georgia Tech's official representative to the 3GPP/ETSI standards body.

16. I have been active in the area of OFDM-MIMO communications systems for several years, and some of my publications in this area include "*Frequency Dependent Space-Interleaving of MIMO OFDM Systems*" Proc. IEEE Radio and Wireless Conference (RAWCON '03), 2003,' "*Embedded Alamouti Space Time Codes for High Rate and Low Decoding Complexity*", Proc. Of IEEE Asilomar Conf. on Signals, Systems and Computers, 2008; and "*Asymmetric Golden Codes for Fast Decoding in Time Varying Channels*", Wireless Personal Communications (2011).

17. I am being compensated at my usual rate of $450/hour for each hour of service that I provide in connection with this case, including time I spend consulting, writing this report, giving deposition testimony and testifying. My compensation does not depend in any way on the content of my testimony and is not affected by the outcome of the case. If called to testify as to the contents of this report, I can and would testify truthfully and competently.

III. LEGAL FRAMEWORK

18. I am a technical expert and do not offer any legal opinions. However, counsel has informed me that in proceedings before the USPTO the claims of an unexpired patent are to be given their broadest reasonable

interpretation in view of the specification from the perspective of one skilled in the art. The broadest reasonable interpretation does not mean the broadest possible interpretation. Rather, the meaning given to a claim term must be consistent with the ordinary and customary meaning of the term (unless the term has been given a special definition in the specification), and must be consistent with the use of the claim term in the specification and drawings. Further, the broadest reasonable interpretation of the claims must be consistent with the interpretation that those skilled in the art would reach. I have been informed that the ’730 Patent has not expired.

19. Counsel has informed me that a claims of a patent are invalid if they do not include “written description” in the specification that describes the claimed invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed invention. An applicant shows possession of the claimed invention by describing the claimed invention with all of its limitations using such descriptive means as words, structures, figures, diagrams, and formulas that fully set forth the claimed invention. I have been informed that this requirement for written description support does not extend to an “*in haec verba*” requirement that the claim language appears verbatim in the specification, and that claims may be supported through express, implicit, or inherent disclosure. Finally, I understand

that a description that merely renders the claimed subject matter obvious does not satisfy the written description requirement.

20. Counsel has also informed me that a person cannot obtain a patent on an invention if his or her invention would have been obvious to a person of ordinary skill in the art at the time the invention was made. A conclusion of obviousness may be founded upon more than a single item of prior art. In determining whether prior art references render a claim obvious, counsel has informed me that courts consider the following factors: (1) the scope and content of the prior art, (2) the differences between the prior art and the claims at issue, (3) the level of skill in the pertinent art, and (4) secondary considerations of non-obviousness. In addition, the obviousness inquiry should not be done in hindsight. Instead, the obviousness inquiry should be done through the eyes of one of skill in the relevant art at the time of the invention.

21. In considering whether certain prior art renders a particular patent claim obvious, counsel has informed me that this Board and U.S. courts allow a technical expert to consider the scope and content of the prior art, including the fact that one of skill in the art would regularly look to the disclosures in patents, trade publications, journal articles, industry standards, product literature and documentation, texts describing competitive technologies, requests for

comment published by standard setting organizations, and materials from industry conferences.

22. I understand that the United States Supreme Court's most recent statement on the standard for determining whether a patent is obvious was stated in 2007 in the *KSR* decision. Specifically, I understand that the existence of an explicit teaching, suggestion, or motivation to combine known elements of the prior art is a sufficient, but not a necessary, condition to a finding of obviousness. Thus, the teaching-suggestion-motivation test is not to be applied rigidly in an obviousness analysis. In determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. Instead, the important consideration is the objective reach of the claim. In other words, if the claim extends to what is obvious, then the claim is invalid. I further understand the obviousness analysis often necessitates consideration of the interrelated teachings of multiple patents, the effects of demands known to the technological community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art. All of these issues may be considered to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent.

23. I also understand that in conducting an obviousness analysis, a precise teaching directed to the specific subject matter of the challenged claim need not be sought out because it is appropriate to take account of the inferences and creative steps that a person of ordinary skill in the art would employ. I understand that the prior art considered can be directed to any need or problem known in the field of endeavor at the time of invention and can provide a reason for combining the elements of the prior art in the manner claimed. In other words, the prior art need not be directed towards solving the same specific problem as the problem addressed by the patent. Further, the individual prior art references themselves need not all be directed towards solving the same problem. Under the *KSR* obviousness standard, common sense is important and should be considered. Common sense teaches that familiar items may have obvious uses beyond their primary purposes.

24. I understand that in many fields it may be that there is little discussion of obvious techniques or combinations, and it often may be the case that market demand, rather than scientific literature or knowledge, will drive the design of an invention. I understand that an invention that is a combination of prior art must do more than yield predictable results to be non-obvious.

25. I understand that for a patent claim to be obvious, the claim must be obvious to a person of ordinary skill in the art at the time of the invention. I

understand that the factors to consider in determining the level of ordinary skill in the art include (1) the educational level and experience of people working in the field at the time the invention was made; (2) the types of problems faced in the art and the solutions found to those problems; and (3) the sophistication of the technology in the field.

26. I understand that at least the following rationales may support a finding of obviousness:

- Combining prior art elements according to known methods to yield predictable results;
- Simple substitution of one known element for another to obtain predictable results;
- Use of a known technique to improve similar devices (methods, or products) in the same way;
- Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
- "Obvious to try"—choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- A predictable variation of work in the same or a different field of endeavor, which a person of ordinary skill would be able to implement;

- If, at the time of the alleged invention, there existed a known problem for which there was an obvious solution encompassed by the patent's claim;
- Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on technological incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art; and/or
- Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior-art reference or to combine prior-art reference teachings to arrive at the claimed invention.

27. I have also been informed that in order to rely on a prior art reference in an obviousness analysis, the prior art reference must be analogous to the claimed invention. I also understand that a prior art reference is shown to be analogous to the claimed invention if it is shown to be either (1) in the same field of endeavor as the claimed invention; or (2) reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention).

28. I understand that the field of endeavor is determined by looking at the claims and specification of the challenged patent.

29. I understand that for a prior art reference to be "reasonably pertinent" to the problem, it must have logically commended itself to an inventor's attention in considering his or her problem. To do this, it is necessary to consider the problem faced by the inventor, as reflected - either explicitly or implicitly - in the patent's specification.

IV. OPINION

A. Level of a Person Having Ordinary Skill in the Art

30. In determining the characteristics of a hypothetical person of ordinary skill in the art of the '730 Patent at the time of the claimed invention, which counsel has informed me is September 28, 2012, I considered several factors, including the type of problems encountered in the art, the solutions to those problems, the rapidity with which innovations are made in the field, the sophistication of the technology, and the education level of active workers in the field. I also placed myself back in the time frame of the claimed invention and considered the colleagues with whom I had worked at that time.

31. In my opinion, a person of ordinary skill in the art would have had (1) a bachelor's degree in electrical engineering, computer engineering, or an equivalent science or engineering field; (2) a working knowledge of digital data

recording systems and their associated hardware and software, including portable, wireless digital data recording systems; and (3) at least two years of experience designing wireless digital data recording systems. Additional industry experience or technical training may offset less formal education, while advanced degrees or additional formal education may offset lesser levels of industry experience.

32. Based on my education, training, and professional experience in the field of the claimed invention, I am familiar with the level and abilities of a person of ordinary skill in the art at the time of the claimed invention. Additionally, I was at least a person having ordinary skill in the art as of the priority date of the ’730 Patent.

B. Opinions Regarding Written Description for the claims of the ’730 Patent

33. I have been asked to opine whether a POSITA would reasonably conclude that the inventors of the ‘730 Patent had possession of the claimed invention as of the priority date of the ‘730 Patent. As described below, it is my opinion that a POSITA would so conclude.

34. It is my understanding that Petitioner argues that the as-filed specification of the ‘730 Patent (“the Specification”) lacks written description support for the following claim elements:

- "a processing element […] configured to […] receive said activation signal" (*i.e.,* the activation signal generated in response to the law enforcement officer actuating the claimed input);
- "a processing element […] configured to […] in response to the activation signal, store a mark in the video file for at least one of the plurality of video frames" which identifies a point in time; and
- "a processing element […] configured to […] upon playback of the video file and in response to receipt from a user request, automatically advance the video file to the marked at least video frame" corresponding to the point in time.

35. It is my opinion that a POSITA, upon reviewing the specification of the '730 Patent and the provisional applications, would conclude that the inventors has possession of each of these claim elements.

1. Opinions regarding "a processing element […] configured to […] receive said activation signal"

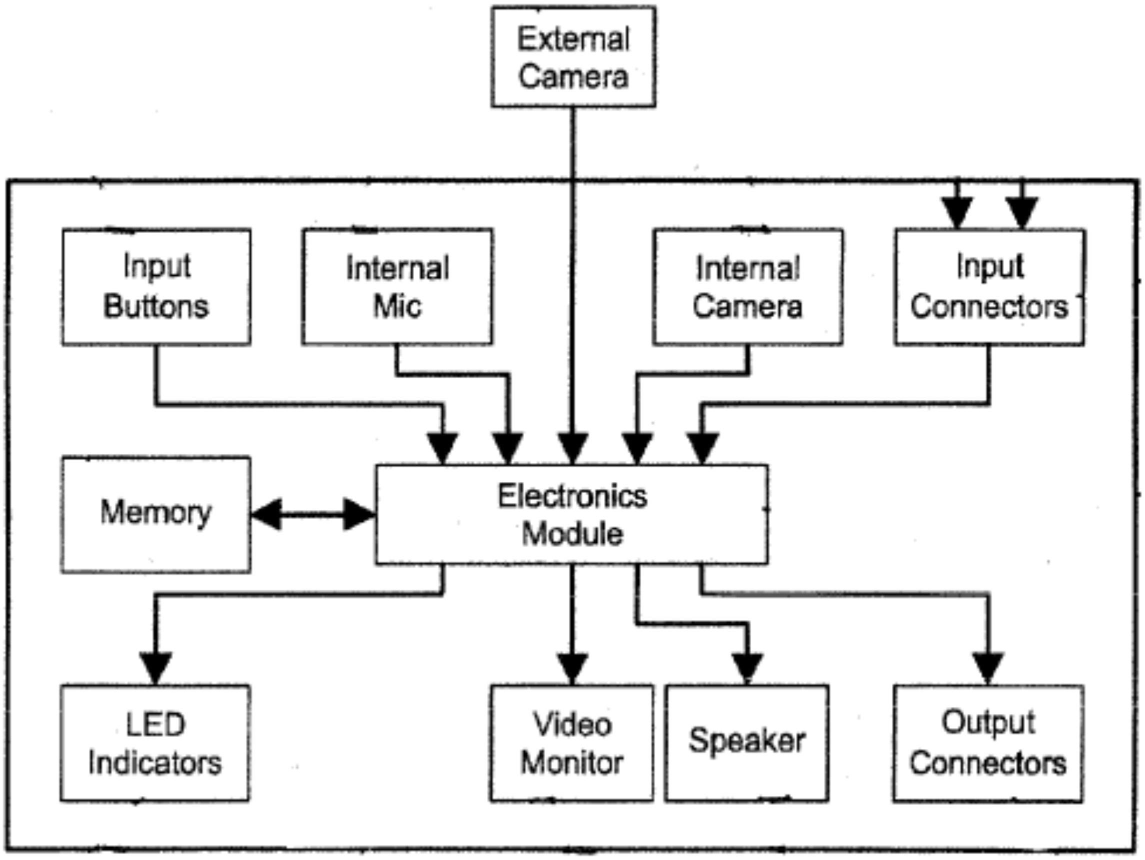
36. Regarding "a processing element […] configured to […] receive said activation signal," I considered first whether a POSITA would conclude that the inventors were in possession of the claimed "processing element." Reviewing the as-filed specification of the '730 Patent, I first note that ¶ [0056] states that "Referring to Fig. 30, the recording component 14 generally includes a processing element 38, a memory element 40, a power element 42, and at

least one communication port 44." I further note that ¶ [0057] gives examples of different processing elements, including "processors, microprocessors, microcontrollers, digital signal processors (DSPs), field-programmable gate arrays (FPGAs), analog and/or digital application-specific integrated circuits (ASICs)," and characterizes the processing element as able to "execute, process, or run instructions, code, software, firmware, programs, applications, apps, processes, services, daemons, or the like, or may step through states of a finite-state machine." This is also consistent with how I would understand the term "processing element."

37. I would understand this processing element to be "associated with" the memory element, as required by the claims, at least by virtue of being housed with it in the recording component as stated in ¶ [0056]. I note also that ¶ [0051] of the '730 Specification states that this same housing includes "user interface elements […] compris[ing] at least a first input 32 and a second input 34." This second input 34 is further described in ¶ [0052], which states "Actuation of the second input 34 thus serves as both an instruction to begin recording and to mark the captured video to identify a time or location in the captured video corresponding to actuation of the second input 34." I would thus conclude that second input 34 corresponds to the claimed "input." I would

therefore understand that the processing element is "associated with" the input at least by virtue of being housed in the housing in which the input is mounted.

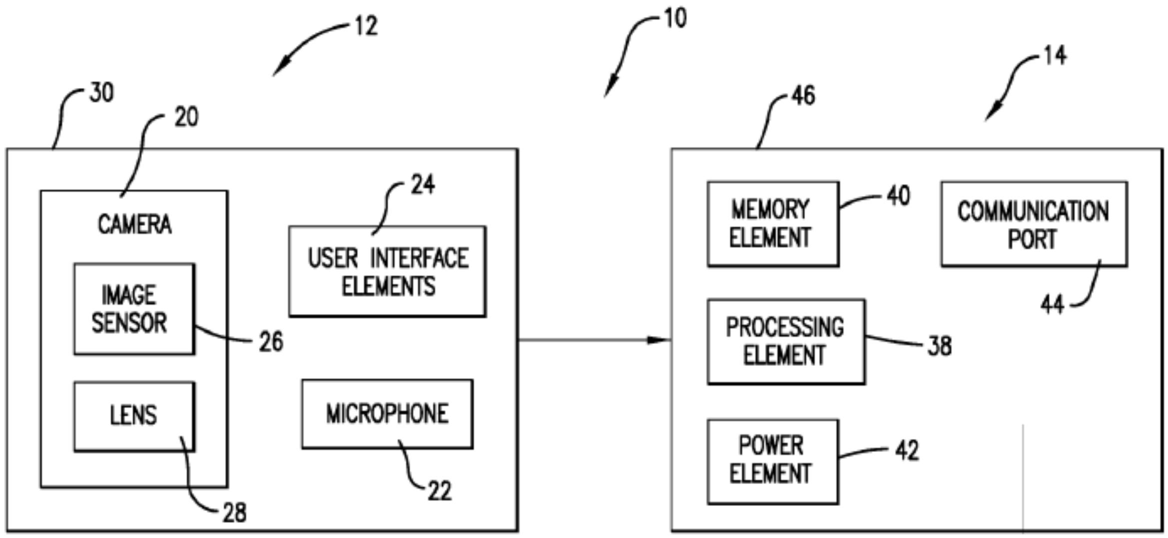
38. In reviewing U.S. Provisional Patent Application No. 61/707,326 ("the '326 Provisional"), I also note that an "electronics module" is disclosed. This electronics module is described at p. 3 as "includ[ing] components operable to receive and execute instructions stored in internal memory." I would understand this as indicating that the electronics module is or includes a processing element. Further, I would understand that this disclosure is consistent with that found in the '730 Specification at least because it is able to "execute, process, or run instructions." Figure 1, depicted below, shows this "electronics module" schematically connected with a "memory" and "input buttons."



39. I would understand this "memory" to be a "memory element" as claimed in the '730 patent. I would further understand these "input buttons" to include the "flag button" described at p. 5 of the '326 Provisional as operable to "place a bookmark in the video to mark the location of significant events in the video sequence." Thus it is also my opinion that a POSITA, upon reviewing the '326 Provisional, would conclude that the inventors did have possession of " a processing element, associated with the memory element and the input."

40. Next, I considered whether a POSITA would understand that this processing element would be "configured to receive said activation signal." It is

my opinion that a POSITA would understand this. First, I note that ¶ [0063] states that “[t]he communication ports 44a,44b are positioned on the housing 46.” (*i.e.,* the housing containing processing element; see FIG. 30). Next, ¶ [0060] further describes these ports, saying “at least one communication port 44 generally allows the recording component 14 to communicate with the camera component 12” and “communication port 44 may be in communication with the processing element 38 and the memory element 40.” I would understand from this that the processing element would receive any signals sent from the camera component via this communication port. Finally, ¶ [0046] makes it clear that “signals comprising instructions or data may be transmitted” between the camera component and the recording component. A POSITA would understand that these “instructions” include the instruction to record and the instruction to mark the video file generated by second input 34, at least because the processing element 38 must receive the activation signal or it would not know to store the mark in the file (see below).



41. In the embodiment depicted in FIG. 30, shown above, the "user interface elements" (which are described as including the second input 34 for instructing marking at ¶ [0034]) are shown as being present in camera component 12. I would thus understand that, in the depicted embodiment, a user would actuate the second input 34 on the camera component 12 and this would cause a signal to be sent via cabling 18 (not labeled in FIG. 30 but shown in FIG 1 as being that cable which connects camera component 12 to recording component 14) to communications port 44a and from there to processing element 34. For at least this reason, it is my opinion that a POSITA, upon reviewing the Specification would reasonably conclude that the inventors were in possession of the claimed "processing element […] configured to […] receive said activation signal."

42. My opinion is further supported by the ‘326 Provisional, which states at p. 4 that “[t]he input buttons are mounted on the console housing and allow for controlling various components and functions of the system.” These input buttons include the “flag button” described above for marking the video file. As shown in FIG. 1 of the ‘326 Provisional (reproduced above) these inputs are depicted as connected to the electronics module, which as I opined above, is or includes a processing element. It is therefore my opinion that any signal sent by the flag button would be received by the electronics module and therefore by the processing element (since that processing element would be how the “various […] functions of the system” are controlled). As such, it is my opinion that a POSITA, upon reviewing the ‘326 Provisional would also reasonably conclude that the inventors were in possession of the claimed “processing element […] configured to […] receive said activation signal.”

43. Finally, I reviewed the portions of Mr. Keller’s declaration regarding the written description support for this claim element for any evidence that would disagree with my conclusions. While Mr. Keller makes a number of conclusory statements, I found no evidence supporting them. I note in passing that Mr. Keller seems to conclude that, because the camera and user interface elements (*i.e.*, the buttons) are disposed in a housing separate from the processing element, that processing element cannot receive the signals from

those components. This conclusion is inconsistent with the Specification, which specifically indicates that these two housings are "communicatively coupled" (¶ [0007]) and may transmit "signals comprising instructions or data to each other" (¶ [0046]). As such, nothing in Dr. Keller's declaration alters my opinion regarding the written description support for this claim element.

2. Opinions regarding "a processing element […] configured to […] in response to the activation signal, store a mark in the video file for at least one of the plurality of video frames"

44. Regarding "a processing element […] configured to […] in response to the activation signal, store a mark in the video file for at least one of the plurality of video frames," I first considered whether a POSITA would reasonably conclude that the inventors were in possession of the claimed "processing element." As I described above, it is my opinion that a POSITA would reasonably conclude this.

45. Next, I considered whether a POSITA would understand that this processing element is "configured to" carry out the claimed function. First, I note that the Specification makes it clear at ¶ [0047] that the captured video is stored at the recording component: "[t]he camera component 12 is configured to […] transmit the captured video to the recording component 14 for storage on a memory of the recording component." As such, I would understand that the processing element 38 of that recording element would perform the processing

steps inherent in storing the captured video, such as receiving the video data from the camera element associating any metadata with the video data (as discussed in ¶¶ [0058] and [0067]) prior to storage in the memory element. For example, the Specification at ¶ [0058] discloses that "processing element 38 may be in communication with the memory element 40 through address busses, data busses, control lines, and the like." A POSITA would find this disclosure wholly consistent with the conventional operation of a processing element and memory, where the processing element reads from and writes to memory by sending the desired storage location on the address bus, sending the data to be written on the data bus (if writing), triggering the read or write via the control lines, and then reading the data from the data bus (if reading). A POSITA would understand that anything written to memory element 40 is written there under the control of processing element 38, and that processing element 38 performs the function of writing whatever is written there.

46. Next, I would understand that the marks (referred to as "bookmarks" in the '326 Provisional) would be stored in or with the video file. The Specification supports this understanding. I note that the Specification at ¶ [0052] describes the marks as be used to "quickly move to marked locations in the captured video upon viewing of the video using standardized video viewing software." The Specification, at ¶ [0066], further states that this viewing may

take place at a computing device other than the one that recorded the video: "[e]mbodiments of the invention may also include a computer program for viewing the captured video on a mobile communications device, such as via an app, at a website, or using viewing software." A POSITA, in reviewing this, would understand that the marks must be stored in (or transmitted alongside) the video file in order to enable this "quickly move to marked location" functionality. Finally, as noted above, the Specification discloses that the processing element receives the "activation signal" that instructs marking. All of this informs me (and would inform a POSITA) that the marks are stored in or with the video file in memory element 40. As such, and for the reasons described above, a POSITA, upon reviewing the Specification, would reasonably conclude that the inventors were in possession of the claimed "processor […] configured to […] in response to the activation signal, store a mark in the video file for at least one of the plurality of video frames."

47. My opinion is further supported by the '326 Provisional, which describes at p. 3 an "electronics module" which "includes components operable to receive and execute instructions stored in internal memory." Such instructions include, for example, the function disclosed at p. 5 of "plac[ing] a bookmark in the video to mark the location of significant events in a video sequence." Upon reviewing these disclosures, a POSITA would understand

that, first, the marks are stored in or with the video file (because the bookmarks are placed "in the video") and, second, that the electronics module (which is or includes a processing element) executes the instruction to do so. As such, a POSITA, upon reviewing the '326 Provisional, would reasonably conclude that the inventors were in possession of the claimed "processor […] configured to […] in response to the activation signal, store a mark in the video file for at least one of the plurality of video frames."

48. Finally, I reviewed the portions of Mr. Keller's declaration regarding the written description support for this claim element for any evidence that would disagree with my conclusions. While Mr. Keller makes a number of conclusory statements, I found no evidence supporting them. As such, nothing in Dr. Keller's declaration alters my opinion regarding the written description support for this claim element.

3. Opinions regarding "a processing element […] configured to […] upon playback of the video file and in response to receipt from a user request, automatically advance the video file to the marked at least one video frame"

49. Regarding "a processing element […] configured to […] upon playback of the video file and in response to receipt from a user request, automatically advance the video file to the marked at least one video frame," I first considered whether a POSITA would reasonably conclude that the inventors were in possession of the claimed "processing element." As I

described above, it is my opinion that a POSITA would reasonably conclude this.

50. Furthermore, I note that the Specification, at ¶¶ [0060], [0061], and [0066], describes additional computing devices of various types: "a server or other computing device," "a computing device," and "a mobile communications device." A POSITA would understand that each of these devices would also include a "processing element," at least because it is the processing element that allows them to "compute" and thus be a "computing device." A POSITA would understand that the processing elements of these computing devices could be "configured" to carry out some or all of the functions ascribed to the processing element in the claims. Such a processing element is "associated with the memory element and the input" of the portable video and imaging system at least because it is configured to work with the portable video and imaging system. For example, a POSITA would understand that only certain mobile communications devices (such as those of an "officer or other user reviewing the video" as discussed at ¶ [0065] of the Specification) would be authorized and configured to view law enforcement video. This would be true for reasons of privacy and well as confidentiality of evidence. A POSITA would understand that it is these mobile communications devices (and their

processors) that are "associated with "associated with the memory element and the input" of the portable video and imaging system.

51. Next, I considered whether that processing element would be configured to "upon playback of the video file and in response to receipt from a user request, automatically advance the video file to the marked at least one video frame." I note that the Specification discloses that "[t]he user can then quickly move to marked locations in the captured video upon viewing of the video using standardized video viewing software." A POSITA would understand that "standardized video viewing software" includes software that can be run on a wide variety of computing devices, at least because this is the benefit of using "standardized" software (as opposed to proprietary software that can only be run a limited set of computing devices). A POSITA would further understand that it is the processing element of these computing devices that runs this software, as it is the function of the processing element to "generally execute, process, or run instructions, code, software, firmware, programs, applications, apps, processes, services, daemons, or the like," as explained by the Specification at ¶ [0057].

52. As such, I would understand the Specification to disclose processing elements (at least inherently, via the various "computing devices") that can run "standardized video viewing software." The functions of this

standardized video viewing software include using the marks stored in the video file (as discussed above) to "upon viewing the video," "quickly move to marked locations in the captured video" (as disclosed in the Specification at ¶ [0052]). Finally, it is "the user" who "can" "quickly move" to the marked locations using this functionality, so this advancing is done "in response to receipt from" the user's request. As such I would understand (and a POSITA would understand) from the '730 Specification that the inventors had possession of "a processing element […] configured to […] upon playback of the video file and in response to receipt from a user request, automatically advance the video file to the marked at least one video frame."

53. Finally, I reviewed the portions of Mr. Keller's declaration regarding the written description support for this claim element for any evidence that would disagree with my conclusions. While Mr. Keller makes a number of conclusory statements, I found no evidence supporting them. As such, nothing in Dr. Keller's declaration alters my opinion regarding the written description support for this claim element.

4. Conclusions

54. For all of the reasons described above, it is my opinion that a POSITA, upon reviewing the '730 Specification, would reasonably conclude that the inventors had possession of the claimed invention. Furthermore, a

POSITA would know how to, and readily be able to, program the disclosed "processing element" to perform each of the disclosed steps.

C. Opinions Regarding the Obviousness of the claims

55. I have also been asked to opine whether the Challenged Claims would be obvious in view of the art of record, and in particular over:

- U.S. Patent Application Publication No. 2009/00276708 A1 to Smith, *et al.* ("Smith");
- International Patent Application Publication No. 2012/037139 A2 to O'Donnell, *et al*. ("O'Donnell");
- U.S. Patent Application Publication No. 2009/0002491 A1 to Haler ("Haler");
- U.S. Patent Application Publication No. 2011/0018998 A1 to Guzik ("Guzik");
- U.S. Patent Application Publication No. 2011/0098924 A1 to Balardeta, *et al.* ("Balardeta"); and
- U.S. Patent No. 6,563,532 B1 to Strub, *et al.* ("Strub").

56. It is my opinion that the Challenged Claims are not obvious over these references, alone or in combination, because (1) none of these references teach or suggest the claim element of a "processing element […] configured to […] wirelessly transmit the video file to a mobile communications device

configured for viewing the video on the mobile communications device," and (2) because a POSITA would not be motivated to combine these references as Petitioner has suggested.

1. Opinions regarding the claim element of a "processing element […] configured to […] wirelessly transmit the video file to a mobile communications device configured for viewing the video on mobile communications device"

57. I understand that Petitioner contends that Smith and/or O'Donnell teach this claim element. For the reasons set forth below, with respect to each of these references, I disagree.

a) Smith

58. Smith relates generally to "[a]n incident recorder [that] records original and supplemental incident information using a simplified user interface." (Smith, Abstract). I understand that Petitioner contends at p. 62 of the Petition that "[a] POSITA would have understood that 'personal computer' at the time of the invention included a '*mobile communications device*' such as a laptop computer, a tablet computer or a mobile phone that would have been '*configured for viewing the video file on the mobile communications device*.'" I disagree, for at least two reasons.

59. First, the claim requires not merely "a mobile communications device," but "wirelessly transmitting" the video file to that "mobile communications device." The petition suggest, at p. 62, that Smith's processor

is configured to wirelessly transmit video files to remote devices "via the ad hoc transceiver" of the shift hub." Based on my review of Smith, I see no such teaching or suggestion of this. Smith, at ¶ [0055] and [0056] suggests that the ad hoc transceiver of the shift hub communicates only with "primary subsystems" (*i.e.,* the incident recorders) and the shift hub's "processor 122" (*i.e.,* the processor and the memory). In other words, the incident recorders are disclosed as being able to wirelessly communicate *only* with shift hub 120. This is further confirmed by Smith's teachings at ¶ [0098]: "[a] wireless interface enables handset 132 [of the incident recorder] to wirelessly communicate with ad hoc transceiver 124 of shift hub 120." A POSITA would not understand Smith to describe the incident recorder as wirelessly communicating "via" the shift hub because the incident recorder includes "wired/wireless interface 349" and therefore, has no need to transmit "via ad hoc transceiver 124." A POSITA would further recognize that Smith includes no description of the incident recorder communicating with any element of system 100 other than shift hub 120.

60. Furthermore, a POSITA would understand that the "shift hub 120" is not a "mobile communications device." First, Smith at ¶¶ [0057] and [0058] describes shift hub 120 as where incident recorders' "check-in" and "checkout" occurs. On reading this, I would understand that shift hub 120 is in a fixed

location, as this would be required so that officers would know where to go to check in and check out their incident recorders. Next, my opinion is further confirmed because Smith states at ¶ [0055] that network 114 provides "secure communication" between shift hub 120 and station hub 110. A POSITA would understand that wired communication is more secure than wireless communication. Smith further emphasizes this need for security earlier in that same paragraph: "Hosting includes a conventional secure computing environment (e.g., *physical security*, *communication security*, access controls, encryption, personnel authentication)." A POSITA would further understand that this wired communication would indicate that both station hub 110 and shift hub 120 are in fixed locations so as to be able to access the wired network. As such, a POSITA would understand that neither Smith's shift hub 120 nor Smith's station hub 110 is a "mobile communications device."

61. Furthermore, a POSITA, upon reviewing Smith, would understand that neither of these devices is "configured for viewing the video file." Rather, Smith suggests at ¶¶ [0058] and [0060] that, upon check in, incident reports are downloaded from the incident recorders by shift hub 120, and then transferred via secure network 114 to evidence manager 112 of station hub 110. Smith also teaches, at ¶ [0031] that "[a] user of an evidence manager may obtain summaries of numerous incident reports using database query and reporting

technologies and may view the results on a workstation." In other words, the video file is retrieved from the incident recorder and stored in a database, whereupon a user wishing to view the video data can download that video file (presumably via secure network 114) to a workstation. A POSITA would understand this teaching of a "workstation" to be a desktop computer connected to secure network 114. Thus Smith does not teach "a mobile communications device configured for viewing the video file" either.

62. Finally, the Petition, at p. 62, suggests that Smith's "personal computer" would be read by a POSITA to include "a laptop computer, a tablet computer, or a mobile phone." I do not agree. It is my opinion that a POSITA, upon reviewing the disclosures of Smith, would understand a "personal computer" to be the same as the "workstation" discussed at ¶ [0037]. This is true for several reasons. First, (as discussed above) Smith emphasizes the need for security of evidence. If evidence were stored on a mobile device, it would be more susceptible to loss or theft due to the reduced "physical security" inherent in a mobile device. Next, mobile communications devices (such as the iPhone and Android smartphones) were known but newly released when Smith was filed. For example, the iPhone first announced in January of 2007 (see Ex. 2002), and Android devices first appeared in 2008. As such, a POSITA

reviewing Smith at the time would be *aware* of smartphones, but would not consider them to be "personal computers."

63. Finally, the term "personal computer" has a long history that would inform a POSITA as to the meaning intended by Smith. Exhibit 2004, although from 2003, includes a definition of "personal computer" that illuminates Smith's discussion of "personal computer, server, [or] network of servers)" that can display incident reports: "[…] Some PCs [personal computers] are personal computers, used by one person, standalone. Some PCs are PCs that sit on a local area network (LAN). For some reasons, people call these PCs workstations. And there are some PCs which have become servers – i.e. they "serve" many PCs. They may do faxing. They may do voice mails for the company. They may run the company's entire phone system. […]." Ex. 2004, p. 3. Thus, a POSITA reviewing Smith would understand that "personal computer" as used in Smith is simply a synonym for "workstation": discussed at ¶ [0037]: a desktop computer connected to secure network 114. Thus, the "personal computer" discussed by Smith at ¶ [0030] is like the server and network of servers, a fixed, immobile device. As such, A POSITA would understand Smith not to teach a "mobile communications device" for this reason as well.

64. Finally, I reviewed the portions of Mr. Keller's declaration regarding the Smith's purported teaching of this claim element for any evidence that would disagree with my conclusions. While Mr. Keller makes a number of conclusory statements, I found no evidence supporting them. As such, nothing in Dr. Keller's declaration alters my opinion regarding Smith's lack of teaching of this claim element.

b) O'Donnell

65. O'Donnell relates generally to point-of-view video cameras and, in particular, to an integrated hands-free point-of view action sports video camera configured for remote image acquisition control and viewing. (O'Donnell, ¶ [0001]). I understand that Petitioner, at p. 63 of the Petition, contends that O'Donnell teaches a "wirelessly transmit[ting] the video file to a mobile communications device configured for viewing the video on mobile communications device" by virtue of camera 10 communicating with viewer/controller 510 via Bluetooth. As I describe below, it is my opinion that this is not "wirelessly transmit[ting] the video file to a mobile communications device configured for viewing the video on mobile communications device."

66. First, the Petition (at p. 62) notes that O'Donnell teaches the camera communicating with the viewer/controller via the Bluetooth wireless connection. A POSITA would understand that Bluetooth is a low-bandwidth

protocol designed to replace serial cables. The pairing process described by O'Donnell (for example, with reference to FIG. 31) is akin to connecting this cable: it allows the two devices to communicate but does not transfer any application data between them. A POSITA would understand that Bluetooth is suitable for transmitting comparatively small amount of data such as command and control information and individual still photographs.

67. A POSITA would further understand that Bluetooth was, at all times in question, unsuitable for transmitting the video files of O'Donnell. For example, Exhibit 2005, from the Bluetooth SIG, gives bandwidths for conventional Bluetooth ranging from 1Mb/s (base rate) to 3 Mb/s (enhanced data rate). These rates represent a theoretical maximum and data rates seen in practice are closer to 70% of these values. By contrast, I note that O'Donnell, at ¶ [0066], contemplates a resolution of 1920 x 1080. O'Donnell, as described above, also contemplates capturing video of "point-of view action sports." A POSITA would understand that video including a great deal of motion (such as that of point of view action sports) requires more bandwidth than video of a static scene. A representative bit rate for video data can be estimated using the "Kush gauge" as follows:

bit rate (in bps) = pixel count per frame x frame rate x motion factor x 0.07

where motion factor is 1 for low action, 2 for moderate action, and 4 for high action. The Kush gauge is a well-known practical formula for estimating bit rate for different types of video encoding used in both industry (see, e.g., https://vzaar.com/blog/video-encoding-guide/) and academia (see, e.g., Gomez-Sacristan, et al, Evaluation of Quality of Service in Smart-Hospital Communications, Journal of Medical Imaging and Health Informatics Vol. 5, 1–6 (2015)).

68. O'Donnell does not specify a contemplated frame rate, but between 24 and 60 frames per second would be typical. Thus, a POSITA would have estimated the bit rate needed for O'Donnell's 1920x1080 "action sports" video would be 1920 x 1080 x 24 x 4 x 0.07 bits per second, or roughly 14Mbps. O'Donnell, at ¶ [0156], also contemplates multiple cameras, so this data rate would be doubled for a value of 28 Mbps. If the higher end of the frame rate range were to be used, the value would instead be 70 Mbps for two cameras. As such, a POSITA would understand that transmitting this video data would significantly exceed the bandwidth capacity of Bluetooth.

69. To confirm this analysis, I used the Kush gauge to determine what frame rate would be feasible during camera aiming and calibration. In such a scenario, each camera could be aimed and calibrated separately, and the motion factor would be 1 for "low action," since the "action sports" would not have

begun. Assuming a throughput of 700kbps (70% of the Bluetooth "base rate" bandwidth of 1Mbps as given in Ex. 2005), the frame rate would be

$$700\text{kbps} \times 1000\ \text{kb/b} \div (1920 \times 1080 \times 1 \times 0.07) \approx 4.822\ \text{images per second}$$

This is consistent with O'Donnell's descriptions of "five photographs per second" while being able to display them in "near real-time" at ¶ [0146]. A POSITA would thus understand that the Kush gauge provides a good approximation of the O'Donnell's bandwidth requirements that is compatible with O'Donnell's disclosure.

70. O'Donnell instead contemplates transferring this video file via SD card or USB, after the recording is complete, for editing by video editor 572 as depicted in FIG. 40. A POSITA would understand that this transfer is necessary in order to edit the video, at least because a comparatively low-power processor, such as that found in viewer/controller 510 (or any mobile communications device), is unsuited for video editing. Both data transfer via SD card and data transfer via USB offer significantly more bandwidth than via Bluetooth, rendering this these transfer protocols more feasible. For example, SD cards allow transfers at a data rate of least 100Mbps and USB 3.0 (which would have been available when O'Donnell was filed) allows data transfer rates up to 3200Mbps to be achieved. A POSIAT would understand that these

protocols are therefore feasible for transmitting O'Donnell's "point-of view action sports" videos in a way that Bluetooth cannot.

71. O'Donnell recognizes this limitation and instead describes (*e.g.,* in FIGs 33-35 and 37) "tak[ing] photos in rapid succession (~1/5 sec)" and sending these "photos" to viewer/controller 510, which "display[s] photos near real time." This allows the cameras to be adjusts (aimed and calibrated) *prior to* the start of video recording. For example, O'Donnell contemplates 3D video using multiple cameras. For such a scenario, a POSITA would understand that the two cameras required for 3D video must be carefully aligned before recording starts or the 3D effect would be lost and viewers would become disoriented by the misaligned images when viewing the video. A POSITA would understand that is simpler and easier to aim, align and calibrate individual still images rather than moving video to avoid trying to align different frames when an object (or the camera) is moving.

72. A POSITA would further understand that this is valuable as it allows the system to avoid storing misaimed or miscalibrated video on SD card 562. As discussed above, O'Donnell's system requires high bit rates for video files, and capturing unwanted video could result in the SD card filling up before the action scene being filmed is complete.

73. However, a POSITA would not interpret this as sending "video" (much less a video file) for several reasons. First, a POSITA would understand that a "photo" or "photograph" is a still image, in contrast to the moving image of a video. Second, the "rapid succession" with which O'Donnell contemplated taking these pictures is too low a frame rate to be video. A POSITA would understand that video is typically captured at a frame rate of at least 24 frames per second, and at a bare minimum rate of 16 frames per second. This is because, as stated in EX2006, the human eye can "form, transmit and analyse 10-12 images per second. […] 16 frames per second and 24 frames per second adequately provide the requirements of visual continuity." A POSITA would understand that 5 frames per second would not provide this visual continuity and the accompanying illusion of motion that is required for video.

74. Thus, a POSITA would understand that (1) O'Donnell does not teach "wirelessly transmit[ting] the video file to a mobile communications device" via Bluetooth as claimed in the Petition at least because it would be technically infeasible to do so and because what O'Donnell's system does transmit would not be understood to be video, let alone a video file.

75. Finally, I reviewed the portions of Mr. Keller's declaration regarding the Smith's purported teaching of this claim element for any evidence that would disagree with my conclusions. While Mr. Keller makes a number of

conclusory statements, I found no evidence supporting them. As such, nothing in Dr. Keller's declaration alters my opinion regarding Smith's lack of teaching of this claim element.

c) Other references

76. It is my understanding that Petitioner does not contend that the claim element "processing element […] configured to […] wirelessly transmit the video file to a mobile communications device configured for viewing the video on mobile communications device" is taught or suggested by any of Haler, Strub, Guzik, or Balerdeta.

d) Conclusion

77. For the reasons described above with respect to each reference, it is my opinion that the art cited by Petitioner fails to teach or suggest the claim element of a "processing element […] configured to […] wirelessly transmit the video file to a mobile communications device configured for viewing the video on the mobile communications device." This claim element (or a substantially similar one) is present in each of the challenged claims. For at least this reason, it is my further opinion that the Challenged Claims are not obvious in view of the art cited by the Petitioner, alone or in combination.

2. Motivation to combine Smith and O'Donnell

78. I have also reviewed Petitioner's contentions regarding the purported modification to combine Smith and O'Donnell to purportedly obtain the embodiment of the invention of the '730 Patent described in dependent claim 8. It is my understanding that Petitioner relies upon the same motivation to combine Smith and O'Donnell (prior to an additional modification by features taught in Haler) in combining these three references to purportedly obtain the embodiment of the invention of the '730 Patent described in independent claim 15. It is my opinion that a POSTA would not be motivated to combine Smith an O'Donnell for the reasons set forth below.

79. I understand that Petitioner had argued that it would be obvious to modify Smith to combine the disclosed components of the incident recorder into a single housing, in order "to further decrease the size and weight of the incident recorder." I do not opine on this purported motivation, but accept it, *arguendo*, as a motivation for modifying Smith to combine the disclosed components of the incident recorder into a single housing.

80. I further understand that Petitioner argues in the Petition at p. 63 that a POSITA would be motivated to modify Smith with O'Donnell's remote mobile communications device for "to eliminate the need for display 730 on Smith's handset 700, making the handset more compact." In my opinion a

POSITA would not be motivated to *decrease* the size of the handset by *increasing* the number of components (*i.e.,* by adding the mobile communications device), having been previously motivated to *increase* the size of the handset by incorporating the camera into it in order to *reduce* the number of components. I would understand a POSITA to be consistently motived, either to increase the number of components or to decrease the number of components, but not both. As such, I do not believe that a POSITA, having previously modified the teachings of Smith in order to arrive at the invention of now-disclaimed independent claim 1, would modify it in the opposite fashion to arrive at the invention of dependent claim 8.

81. I further understand that Petitioner contends, in the Petition at p. 63, that a POSITA would be motivated to modify Smith "to facilitate convenient review of recorded video files and easy additions of secondary incident information." However, based on my review of Smith, this functionality is already described, at least at ¶¶ [0033] and [0046]. At least because this functionality is already present in the disclosed system of Smith, it is my opinion that a desire to add it would not motivate a POSITA to combine O'Donnell's viewer/controller with Smith's incident recorder.

82. Finally, I understand that Petitioner contends, in the Petition at pp. 63-64, that a POSITA would be motivated to modify Smith "to allow law

enforcement officers to view and edit video qualities (*e.g.*, color balance brightness and contrast) across variable-lit environments." Again, however, my review of Smith seems to indicate that the functionality of modifying video settings (including at least video resolution) is present in Smith, as disclosed at ¶ [0108]. As such, at least because this functionality is already present in the disclosed system of Smith, it is my opinion that a desire to add it would not motivate a POSITA to combine O'Donnell's viewer/controller with Smith's incident recorder.

3. Conclusion

83. As elaborated above, it is my opinion that the art cited by Petitioner, alone or in combination, does not render obvious any of the Challenged claims at least because (1) none of the art cited by Petitioner teaches or suggests the claim element of a "processing element […] configured to […] wirelessly transmit the video file to a mobile communications device configured for viewing the video on mobile communications device" and (2) a POSITA would not be motivated to modify Smith's incident recorder system to incorporate O'Donnell's viewer/controller.

I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

By: ______________________________

Dr. Vijay K. Madisetti

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Employment:

- 1984-1989: Post Graduate Researcher (UC Berkeley),
- 1989-present: Full Professor of Electrical & Computer Engineering (**Georgia Tech, Atlanta, GA 30332**).

Areas of Technical Interest – Wireless & Mobile Communications, Computer Engineering, Circuit Design (Analog/Digital), Software Engineering, Digital Signal Processing, Wireline & Wireless Computer Networks, Software Systems**,** Control Systems, Cloud Computing.

Startup Companies:

Director, **VP Technologies, Inc**. (1995-): A startup commercialized through Georgia Tech's Advanced Technology Development Corporation (ATDC) focusing on digital software and hardware design services for military market. http://www.vptinc.com

Director, **Soft Networks, LLC** (2001-2007): A startup commercialized through Georgia Tech support focusing on software development tools and compilers for Cellular/WiFi/VOIP/telecommunication products. http://www.soft-networks.com

Director, **Elastic Video Inc.** (2007- 2009): A startup commercialized through Georgia Tech's VentureLab (http://venturelab.gatech.edu) development image and video processing software for wireless & IP networking.

Litigation Experience (2011-2018) With Testimony

(Note: There may be multiple cases between the parties, e.g., District Court v. ITC, US versus Foreign Cases)

Case Name: HTC v. IPCOM –
Case No: 1:2008-cv-01897 (District of Columbia)
Expert for IPCOM.
(3G Standards: 2009 – 2012)
Testified by deposition

Case Name: Apple v. Kodak
Case No. **ITC 337-TA-717 (ITC)**
Expert for Kodak
(Digital Image Processing & UI: 2008-2011)
Testified at trial

Case Name: Harkabi v. Sandisk,
Case No: 1:08-cv-08203-WHP
Expert for Harkabi
(Digital Rights Management for Flash Devices: 2010-2012)
Testified at trial

Case Name: Yangaroo Inc. v. Destiny Media Technologies, Inc.
Case No: 09-C-0462
Expert for Yangaroo.
(Digital Rights Management Streaming: 2010-2011)
Testified by deposition

Case Name: Motorola v. Microsoft,
Case No: **ITC 337-TA-752**
Expert for Motorola
(Peer to Peer Gaming: 2011-2013)
Testified at trial

Case Name: Motorola v. Apple,
Case No: **ITC 337-TA-745**
Expert for Motorola
(Mobile Applications & UI: 2011-2012)
Testified at trial

Case Name: Innovative Sonic Ltd. vs. RIM
Case No: 3:11-cv-00706-K-BF
Expert for Innovative Sonic Ltd

(3G Standards – Encryption, HSDPA: 2010-2013)
Testified at trial

Case Name: Interdigital v. ZTE et al (JDA)
Case No: ITC 337-TA-800
Expert for JDA
(3G Standards – HSDPA: 2012-2013)
Testified at trial

Case Name: Kodak v. Apple, HTC
Case No: ITC 337-TA-831
Expert for Kodak
(Digital Image Processing & UIs: 2011-2012)
Submitted reports

Case Name: Calypso v. T-Mobile
Case No: 2:08-CV-441-JRG-RSP
Expert for T-Mobile
(Unified Communications: 2012-2013)
Testified by deposition

Case Name: TracBeam v. AT&T
Case No: 6:11-cv-00096-LED
Expert for AT&T
(GPS Services: 2011-2012)
Testified by deposition

Case Name: BT v. Cox/Comcast
Case No: 10-658 (SLR) Delaware
Expert for Cox and Comcast
(VOIP, Network Management: 2012-2014)
Testified by deposition

Case Name: Ericsson v. Samsung
Case No: 337-TA-862 (ITC)
Expert for Ericsson
(RF Receivers, EDGE Standards: 2012- 2013)
Testified at trial

Case Name: IPR – ContentGuard v. ZTE
Expert for ZTE
(DRM for Digital Devices: 2012-2014)
Testified by deposition

Case Name: Emblaze v. Apple
Case No: 5:11-cv-01079-PSG

Expert for Emblaze
(Digital Video/Audio Streaming: 2012-2014)
Testified at trial

Case Name: Emblaze v. Microsoft
Case No: 3:12-cv-05422-JST
Expert for Emblaze
(Digital Video/Audio Streaming: 2012 - Present)
Ongoing

Case Name: MMI v. RIM
Case No: 2:10-cv-00113-TJW-CE
Expert for MMI
(Area: Mobile Devices/User Interfaces: 2012- 2013)
Testified by deposition

Case Name: Wi-LAN v. Apple
Case No: 13-cv-0790 DMS
Case No: 3:14-cv-010507-DMS-BLM
Expert for Wi-LAN
(Area: 4G/3G Wireless Communications: 2013 –)

Testified by Deposition

Case Name: Sentius LLC v. Microsoft
Case No: 5:13-cv-00825-PSG
Expert for Sentius
(Area: Enterprise Software Systems: 2014-2015)

Testified by deposition

Case Name: Medius Eagle Harbor v. Ford
Case No: 3:1-cv-05503-BHS
Expert for Medius Tech
(Area: Automotive Multimedia Systems: 2014-)

Testified at Trial

Genband US LLC v. Metaswitch Networks
No 2:14-cv-33 (ED Texas Marshall)
Expert for Metaswitch Networks
Technology: Voice & Data Over IP Networks (2014-2015)

Submitted declarations & deposition

Enterprise - Systems Technologies S.a.r.l v. Samsung Electronics Co. Ltd

Case No: 6:14-cv-555-MHS and ITC Inv. No. 337-TA-925
Expert for Samsung
Technology: Android Operating System (2014-2015)

Testified by deposition

Ericsson Inc. v. Apple Inc.
Case No: 2:15-cv-287 (ED Texas) and ITC-337-952/953
Expert for Ericsson
Technology: 4G Wireless Systems (2015 – present)

Testified by deposition & Trial

Intellectual Ventures LLC v. Motorola Mobility LLC (Google)
Case No: 13-cv-61358-RST (SD Florida)
Expert for Google
Technology: Wireless Systems (2013- present)

Testified by deposition (IPR)

Intellectual Ventures LLC v. Nikon Corp
C.A No. 11-1025-SLR (Delaware)
Expert for Nikon
Technology: Wireless Systems (WiFi) (2014-2015)

Submitted declarations

Masimo v. Mindray Biomedical Electronics Co. / Philips
Case No: SACV-12-02206 CJC (JPRx) C. D. California
8:12-cv-02206-CJC-JPR
Expert for Masimo
Technology: Pulse Oximetry (2014 – 2016)

Submitted reports, testified by deposition

Samsung v. Nvidia
Case No: 3:14-cv-757-REP ED Virginia
Expert for Samsung
Technology: Microprocessors & Memories (2014 – 2016)

Submitted reports & Deposition & Trial

Chrimar v. HP/Cisco/Alcatel/Dell/Adtran/AeroHive/D-Link/TP-Link/TrendNet/Juniper Networks/CoStar/Accton/AMX
Case No: 4:13-cv-1300-JSW, Case 6:15-cv-163

Case No: 6:15-cv-00618-JRG-JDL

Expert for Chrimar
Technology: Power over Ethernet (2015-present)

Submitted reports & Deposition & Trial

Chamberlain v. Ryobi/TTI
Case No: 1:16-cv-06097
Expert for Ryobi
Technology: Wireless/IoT/Barrier Movement (2016 – present)

Submitted reports & deposition & trial testimony

IOEngine v. IMC/Imation
Case No: cv-14-1572-GMS
Expert for IMC/Imation
Technology: Networked Storage Device (2016-2017)

Submitted reports & deposition & trial testimony

Huwei v. Samsung
Case No: 3:16-cv-2787-WHO
Expert for Samsung
Technology: 4G/LTE Random Access Protocols (2016-present)

Submitted reports & deposition

Hitachi Maxell v. ZTE/Huawei
Case No: 5:16-cv-00178-RWS
Expert for Hitachi Maxell
Technology: Digital Cameras

Submitted reports & deposition (2017 – present)

Qualcomm v. Apple
Case No: 17-ccv-0108-GPC-MDD/Also, Related ITC/FTC Matters
Expert for Qualcomm
Technology: 4G/Wireless Communications/Smartphones (2017-present)

Optis v. Huawei
Case No: 2:17-cv-123 (ED Texas)
Expert for Optis Wireless
Technology: 4G/Video (2017-present)

Submitted reports & deposition (2017 – present)

Broadcom v. Sony
Case No: 8:16-cv-1052

Expert for Broadcom
Technology: Wi Fi

No activity - settled (2017 – 2017)

Ameranth v. Hyatt Corporation
Case No: 3:11-cv-1810
Expert for Hyatt
Technology: Wireless eCommerce Applications (2017-present)

Rovi v. Comcast
ITC No. 337-TA-1103
Expert for Rovi
Technology: Digital Video & interactive GUI (2018-present)

Beckman Coulter v. Sysmex
Case No: 1:17-cv-24049-DPG
Expert for Sysmex
Technology: Medical Instrumentation Automation (2017-present)

TQ Delta
Expert for TQ Delta
Technology: DSL Technologies (2018-present)

Additional matters include declarations supporting IPRs at the PTAB for Google (US Patent 8,601,154), On Semiconductor (US Patent 6,212,079), Ubisoft (US Patent 5,490,216), Broadcom (WiFi), Sony (US Patent 6,101,534), Kia, (US Patent 5,530,431) Fortinet (US patent 6,195,587), and ZTE (US Patent 7,523,072), and Ericsson, Amazon, Ring, Digital Ally.

Earned Degrees

1. **B. Tech (Hons), Electronics & Electrical Comm. Engineering**
   Indian Institute of Technology (IIT), Kharagpur, India
   1984.

2. **Ph.D., Electrical Engineering & Computer Sciences (EECS)**
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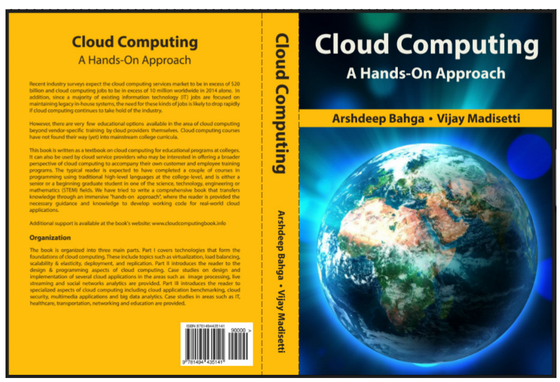

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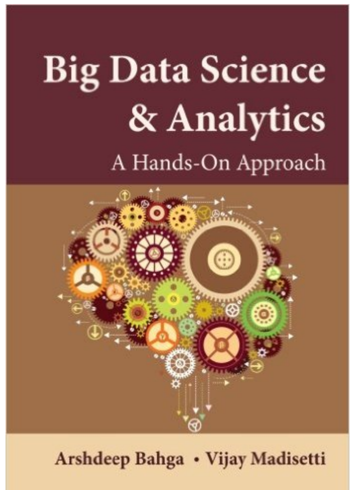

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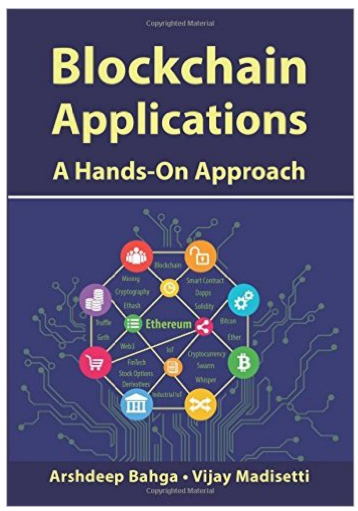

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2. **Voice & Video over Mobile IP Networks <draft-madisetti-argyriou-voice-video-mip-00.txt>**
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3. **Enhancements to ECRTP with Applications to Robust Header Compression for Wireless Applications**. <**draft-madisetti-rao-suresh-rohc-00.txt>**
   Madisetti, V.; Rao, S., Suresh, N.
   IETF Internet-Draft, June 30, 2003.

Ph.D. Students Graduated

1. **Brian T. Kelley, 1992**
   VLSI Computing Architectures for High Speed Signal Processing
   Member of Technical Staff, Motorola.

   Winner of Dr. Thurgood Marshall Dissertation Fellowship Award

2. **Bryce A. Curtis, 1992**
   Special Instruction Set Multiple Chip Computer for DSP
   Member of Technical Staff, IBM

3. **Jaejin Lee, 1994**
   Robust Multitrack Codes for the Magnetic Channel
   Professor, Yonsei University, Korea

4. **Mohamed S. Ben Romdhane, 1995**
   Design Synthesis of Application-Specific IC for DSP
   Director of IP, Rockwell.

5. **Shoab A. Khan, 1995**
   Logic and Algorithm Partitioning on MCMs
   Professor, National University of Science & Technology, Pakistan

6. **Lan-Rong Dung, 1997**
   VHDL-based Conceptual Prototyping of Embedded DSP Architectures
   Professor, National Chaio Tung University, Taiwan.

   Winner of VHDL International Best PhD Thesis Award, 1997

7. **Thomas W. Egolf, 1997**
   Virtual Prototyping of Embedded DSP Systems
   Distinguished Member of Technical Staff, Agere

8. **Alvaro Marenco, 1997**
   On Homomorphic Deconvolution of Bandpass Signals
   Professor, Texas A&M University.

   Winner of GIT ECE Outstanding Teaching Assistant Award

9. **Shahram Famorzadeh, 1997**

BEEHIVE: A Distributed Environment for Adaptive Signal Processing
Member of Technical Staff, Rockwell.

10. Timothy J. Klausutis, 1997
Adaptive Lapped Transforms with Applications to Image Coding.
US Air Force/Univ. of Florida.

11. Lan Shen, 1998
Temporal Design of Core-Based Systems
Member of Technical Staff, IBM

12. James DeBardelaben, 1998
Optimization Based Approach to Cost Effective DSP Design
Research Scientist, Johns Hopkins University

Georgia Tech ECE Faculty Award

13. Sangyoun Lee, 1999
Design of Robust Video Signal Processors
Professor, Yonsei University

US Army Sensors Lab Research Excellence Award, 1999

14. Rahmi Hezar, 2000
Oversampled Digital Filters
Member of Technical Staff, Texas Instruments

15. Yong-kyu Jung, 2001
Model-Based Processor Synthesis
Professor, Texas A&M University

16. Mustafa Turkboylari, 2002
Handoff Algorithms for Wireless Applications
Member of Technical Staff, Texas Instruments

17. Yun-Hui Fan, 2002
A Stereo Audio Coder with Nearly Constant Signal to Noise Ratio
Post-Doctoral Research Associate, Northeastern University

18. Subrato K. De, 2002
Design of a Retargetable Compiler for DSP
Member of Technical Staff, Qualcomm

US Army Sensors Lab Research Excellence Award, 1999

19. Chonlameth Aripnikanondt, 2004
System-on-Chip Design with UML
Professor, King Mongkut's University, Thailand.

US Army Sensors Lab Research Excellence Award, 1999

20. Loran Jatunov, 2004
Performance Analysis of 3G CDMA Systems

Senior Research Scientist, Soft Networks, LLC.

21. **Antonios Argyri**ou, 2005, Serving in Hellenic Army.

22. **Pilho Kim, 2009, Scientist, VP Technologies, Inc.**

23. **M. Sinnokrot, 2009, Staff Engineer, Qualcomm.**

Awards & Honors

1. **Jagasdis Bose National Science Talent Fellowship**, Indian Institute of Technology, Kharagpur, 1980-1984.

2. **General Proficiency Prize**, Indian Institute of Technology, Kharagpur, 1984.

3. **Demetri Angelakos Outstanding Graduate Student Award**, Univ. of California, Berkeley, 1989

4. **Ira Kay IEEE/ACM Best Paper Award** for Best Paper presented at IEEE Annual Simulation Symposium, 1989

5. **IBM Faculty Development Award** 1990

6. **Technical Program Chair**, IEEE Workshop on Parallel and Distributed Simulation. 1990.

7. **Technical Program Chair**, IEEE MASCOTS'94

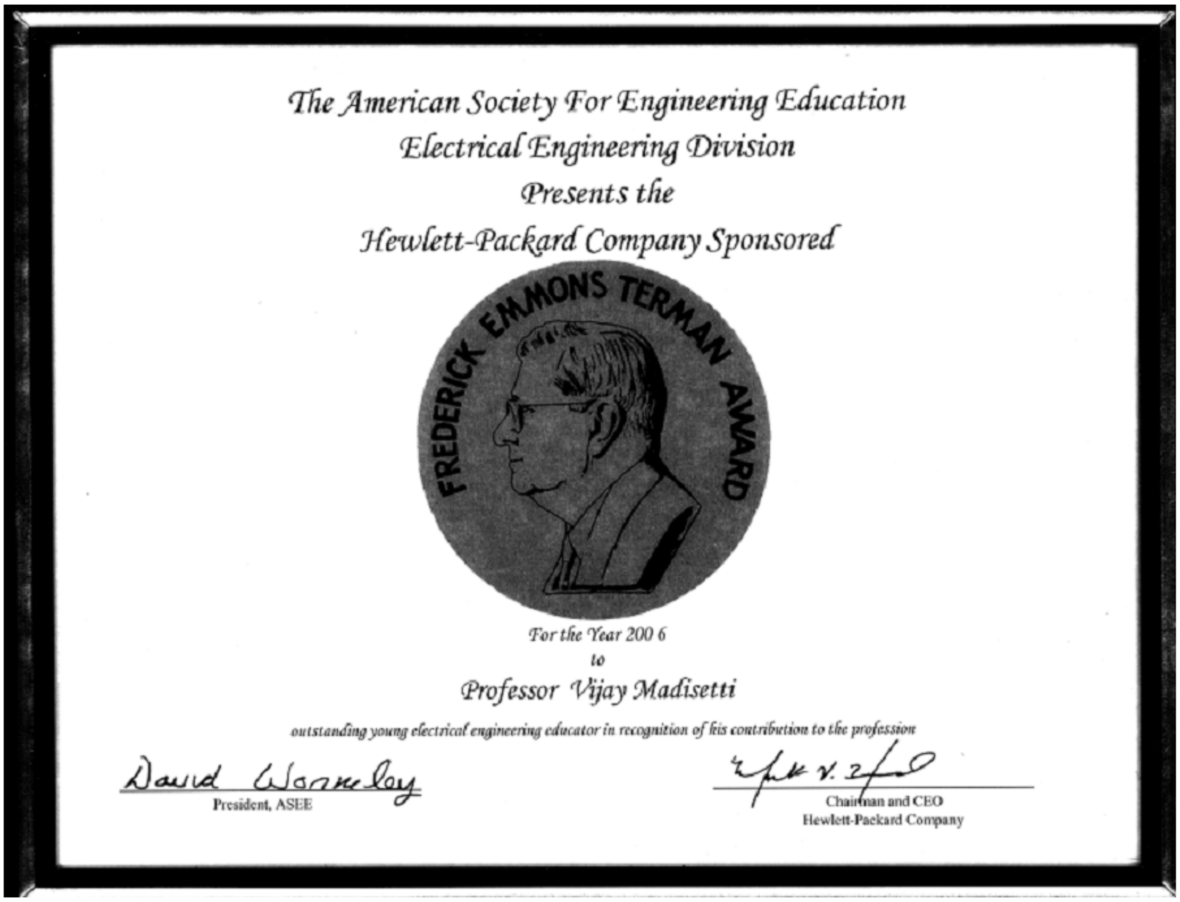
8. **NSF RI Award**, 1990

9. **VHDL International Best PhD Dissertation Advisor Award**, 1997

10. **Georgia Tech Outstanding Doctoral Dissertation Advisor Award**, 2001.

11. **ASEE 2006 Frederick Emmons Terman Medal, 2006.**

12. **Fellow of IEEE**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Intellectual Property Disclosures (Georgia Tech)

Patent	Date	Description
2843	2004	Method and Apparatus for Improving the Performance of Wireless LANs
2825	2003	Method and Apparatus for Optimal Partitioning and Ordering of Antennas for Layered Space-Time Block Codes in MIMO Communications Systems
2815	2003	How to Rapidly Develop a SyD Application
GSU-023	2003	Rapid Development of SyD Applications
2810	2003	System on Mobile Devices Middleware Design
2718	2003	A Transport Layer Algorithm for Improved Anycast Communication
2717	2003	A Novel Transport Layer Load-Balancing Algorithm
2716	2003	A Transport Layer QoS Algorithm
2715	2003	A Novel Transport Layer Algorithm for MPLS Performance
2659	2002	A New Algorithm and Technology for Implementing Mobile IP with Applications to Voice and Video over Mobile IP
2656	2002	Debugging with Instruction-Level Reverse Execution
2655	2002	Embedded Software Streaming

2539		System of Databases: An Enabling Technology for Programming
2517	2002	A Dynamic Instantiated Real-Time Operating System Debugger
2516	2002	A Dynamic Real-Time Operating System
GSU-009	2001	System of Databases: Architecture,, Global Queries, Triggers and Constraints
2480	2001	Mobile Fleet Application based on SyD Technology
2479	2001	System of Databases: A model with coordination links and a calendar application
1893	1999	Beehive
1726	1995	Very High Scale Integrated Circuit Hardware Description Language Models (VHDL Models)
1401	1995	Self-Compensation Receiver (SCR)

Issued Patents: 9,935,772, 9,769,213