Apple Inc. v. Samsung Electronics Co. Ltd. et al Doc. 1013 Att. 14

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Counterclaim-Defendant APPLE INC.

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN JOSE DIVISION

APPLE INC., a California corporation,

Plaintiff,

v.

SAMSUNG ELECTRONICS CO., LTD., a Korean corporation; SAMSUNG ELECTRONICS AMERICA, INC., a New York corporation; and SAMSUNG TELECOMMUNICATIONS AMERICA, LLC, a Delaware limited liability company,

Defendants.

Case No. 11-cv-01846-LHK

DECLARATION OF MICHEL MAHARBIZ, PH.D. IN SUPPORT OF APPLE'S OPPOSITION TO SAMSUNG'S MOTION FOR SUMMARY JUDGMENT

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I, Michel Maharbiz, Ph.D., declare as follows:

1. I am an Associate Professor of Electrical Engineering and Computer Science at Berkeley.

2. I submit the following Declaration on behalf of plaintiff Apple Inc. ("Apple"). If called as a witness in this action, I am competent to testify of my own personal knowledge, to the best of my recollection, as to the matters set forth in this Declaration.

3. I reserve the right to supplement or amend this Declaration, if additional facts and information that affect my opinions become available. My Declaration is based on the materials that have been available to me up to the date of this Declaration.

4. I am being compensated for my work in connection with this matter at the rate of $300 per hour. I also get reimbursed for reasonable travel and out-of-pocket expenses in relation to my work on this case. My compensation is not contingent upon the outcome of this case. Neither the amount of my compensation nor my hourly billing rate depends on whether I am obligated to testify at deposition or trial.

I. PROFESSIONAL AND EDUCATIONAL BACKGROUND

5. I received my Ph.D. in Electrical Engineering and Computer Science from the University of California at Berkeley ("Berkeley") in 2003. I received a Bachelor's of Science degree in Electrical Engineering and Computer Science from Cornell University in 1997. My Ph.D. thesis was on the topic of microfabrication and miniaturization of instrumentation. Before I joined the faculty of Berkeley, I was an Assistant Professor at the Electrical Engineering and Computer Science Department at the University of Michigan at Ann Arbor.

6. I am currently an Associate Professor of Electrical Engineering and Computer Science ("EECS") at Berkeley. I am also a Co-Director of the Berkeley Sensor and Actuator Center (BSAC), which is the National Science Foundation Industry/University Cooperative Research Center for Microsensors and Microactuators. BSAC conducts industry-relevant, interdisciplinary research on micro- and nano-scale sensors, moving mechanical elements, microfluidics, materials, processes and systems that combines knowledge of integrated-circuit, biological, and polymer technologies.

7. The courses I have taught at Berkeley include EE147 ("Introduction to Microelectromechanical Systems (MEMS)"), EE40 ("Introduction to Microelectronic Circuits"), CS150 ("Components and Design Techniques for Digital Systems") and EE105 ("Microelectronic Devices and Circuits"). My classes have covered the topics of touch screens and touch sensor panels. In EE40, for example, I have presented publicly available teardowns of tablets and their touch screens to demonstrate such topics as how a touch screen works, the ITO layers, capacitance, and fabrication.

8. A list of my publications is included in my Curriculum Vitae (attached hereto as Exhibit A is a true and correct copy of my Curriculum Vitae), and includes a textbook on circuits as well as more than 40 journal and technical conference publications in high impact venues. The textbook I have coauthored, "Circuits," covers the topics of touch screens and touch sensor panels and has detailed discussion of many of the components relevant to U.S. Patent 7,663,607 ("the '607 Patent") (attached hereto as Exhibit B is a true and correct copy of the '607 Patent). It also includes a technology brief that analyzes and compares touch screen technologies.

9. My research at Berkeley has covered a variety of topics, including the extreme miniaturization of electronic systems for neural recording and stimulation, microfabrication of flexible polymer microelectrocorticography arrays, energy scavenging devices for ultra-low power CMOS circuits, and microfluidic component design among others. My current research interests include building micro/nano interfaces to cells and organisms and exploring bio-derived fabrication methods. I was the recipient of a 2009 NSF Career Award for research into developing microfabricated interfaces for synthetic biology. I am a Senior Member of the IEEE (Institute of Electrical and Electronics Engineers).

10. I am a cofounder of TweedleTech, a company that applies human interface design principles to create a radio frequency ID based sensor device that detects and identifies multiple components placed on it through the use of a matrix of row and column electrodes. The sensor detects and identifies radio frequency tags that are placed over a platform or substrate and includes a display component in the form of a projector.

11. My research activities have been funded by DARPA, NSF, NIH, and the U.S. Army. My research has also been partially funded over the last several years by grants from private companies. Such grants are usually designated as intended to support a specific research project or research center, and are not gifts to me personally.

12. As of February 18, 2012, I am listed as co-inventor of U.S. Patent Application Nos. 20100331083, 20100004062, and 20090085427. Each is accessible via http://appft1.uspto.gov/netahtml/PTO/search-bool.html.

II. UNDERSTANDING OF APPLICABLE LEGAL STANDARDS

13. I understand that the parties have proposed differing constructions of certain terms in the '607 Patent, and that the parties may have differing constructions of terms that were not part of the claim construction hearing and for which no claim construction Order has been issued. Unless otherwise specified, I have interpreted the claims as one of ordinary skill in the art would have at the time the relevant patent was filed in light of the teachings of the patent and its prosecution history.

14. I understand that in construing claims of a patent one should first consider the intrinsic evidence, which includes the patent's claim language, its specification, and its prosecution history. In particular, I should first consider the words of the claims themselves, giving those words their customary and ordinary meaning as understood by one of ordinary skill in the art. I then must consider the patent specification to determine whether the inventor used any terms or words in a manner inconsistent with their plain and ordinary meaning. In addition to the claims and the specification, I also must review the prosecution history, which is the complete record of all the proceedings before the United States Patent and Trademark Office. This is because a patent applicant might have affirmatively, or by implication, limited claim scope during prosecution.

15. If the intrinsic evidence is not conclusive, I understand I may consider extrinsic evidence to ensure that a claim construction is not inconsistent with clearly expressed and widely held understandings in the pertinent technical field. Such extrinsic evidence may take the form of expert and/or inventor testimony, dictionaries, technical treatises, and articles. I further

understand that I may not rely on extrinsic evidence to contradict or vary the meaning of claims provided by the intrinsic record.

16. I further understand that the claims should be construed from the standpoint of a hypothetical person of ordinary skill in the art as of the invention date of the asserted patent. I understand that claim construction is a matter of law and will be determined by the Court.

17. I have been informed by counsel that by United States statute, a patent is presumed valid. I understand that the patent challenger bears the burden of proving invalidity of the patent by clear and convincing evidence.

18. It is my understanding that, for a patent to be anticipated, each and every element of a claim, as properly construed, must be found either explicitly or inherently in a single prior art reference, subject to the limitations imposed by § 102 in paragraphs (a)–(g). Under the principles of inherency, if the prior art necessarily functions in accordance with, or includes the claimed limitations, it anticipates. I also understand that, in order to anticipate, a prior art reference must also be enabling, such that one of ordinary skill in the art could practice the invention without undue experimentation.

19. I also understand that a claim is invalid under 35 U.S.C. §102 (a) if the claimed invention was known or used by others in the U.S., or was patented or published anywhere, before the applicant's invention. I further understand that a claim is invalid under 35 U.S.C. §102 (b) if the invention was patented or published anywhere, or was in public use, on sale, or offered for sale in this country, more than one year prior to the filing date of the patent application. And a claim is invalid, as I understand, under 35 U.S.C. §102 (e), if an invention described by that claim was described in a U.S. patent granted on an application for a patent by another that was filed in the U.S. before the date of invention for such a claim. A claim is also invalid, as I understand, under 35 U.S.C. §102 (f) if the invention was invented by another prior to the claimed invention. It is also my understanding that a claim is invalid under 35 U.S.C. §102 (g)(2) if, prior to the date of invention for the claim, the invention was made in the U.S. by another who had not abandoned, suppressed or concealed the invention.

20. In determining whether an invention is obvious, I understand that it is impermissible to simply engage in hindsight reconstruction of the claimed invention, using the applicant's invention as a template and selecting elements from the references to fill the gaps. In particular, I understand that it is impermissible to use the invention to define the problem that the invention solves when analyzing a defense of obviousness. I have been instructed that objective consideration of seemingly simple technology is often difficult because, once the problem and solution appear together in the patent specification, the advance may appear self-evident. Instead, I have been told that the proper analysis requires a form of amnesia that "forgets" the claimed invention and analyzes the alleged prior art and the understanding of the engineering problems at the time of the invention.

21. In order for a combination of multiple references to be obvious, an ordinary person of skill in the art should have some reason to combine the references. When considering a reference for purposes of an obviousness analysis, the reference must be taken for everything it teaches, including information that diverged from or teaches away from the invention at hand.

22. Additionally, a reference qualifies as prior art for an obviousness determination only when it is analogous to the claimed invention. A reference can be analogous in two ways. First, when the art is from the same field of endeavor. Second, if the matter with which the reference deals logically would have commended itself to an inventor's attention in considering the problem or has the same purpose as the claimed invention and relates to the same problem.

23. I also understand that a combination of known elements can be obvious when it yields predicable results. At the same time, a finding of obviousness may not be proper where the prior art merely provides a person of ordinary skill in the art a promising field for experimentation. In other words, where it is obvious to try a particular combination of known elements to solve a problem and there are a finite number of known, predicable solutions, the result is likely the product not of innovation but of ordinary skill and common sense. At the same time, a finding of obviousness may not be proper where the prior art merely provides a person of ordinary skill in the art a promising field for experimentation. I have further been informed that a proper obviousness analysis focuses on what was known or obvious to a person of ordinary skill

in the art, not just to the patentee, at the time of the invention. I also understand that practical and common sense considerations should guide a proper obviousness analysis.

24. I also understand that the law distinguishes between one of ordinary skill in the art and inventors. Under this distinction, one should not go about determining obviousness by inquiring into what patentees or inventors would have known or would likely have done faced with the revelations of references. A person of ordinary skill in the art thinks along the line of conventional wisdom and is not one who undertakes to innovate.

25. I have been instructed that secondary considerations of non-obviousness must be considered in an obviousness analysis. Such secondary considerations with respect to a claimed invention include, among other things: (1) commercial success of the claimed invention; (2) praise or industry acclamation for the claimed invention, (3) initial expressions of disbelief or skepticism by experts in the field, (4) copying, and (5) failure of others. I understand that these "objective criteria" help to inoculate the obviousness analysis against an impermissible hindsight reconstruction. I understand that under the law, technical advances often occur through incremental steps and that marginal advances may seem in retrospect to be simple, particularly when retracing the route already taken by the inventor. For these reasons, I understand that these objective indicia are important evidence of how the patented device is viewed in the marketplace, by those directly interested in the product.

III. BACKGROUND OF THE '607 PATENT INVENTION

26. If called to testify at trial on the topic of the definition of a person of ordinary skill in the art for the '607 Patent, I expect to testify regarding the skill, education, and experience that a person of ordinary skill in the relevant art would have had at the time of the invention of the '607 Patent. In my opinion, the relevant art involves multipoint touchscreens. In my opinion, a person of ordinary skill in the relevant art of the '607 Patent at the time of the invention would have a Bachelor's degree in electrical engineering, physics, computer engineering, or an equivalent, and two or more years of experience working with input devices.

27. The '607 Patent discloses an elegant touch-screen solution for electronic devices, particularly graphics-based mobile or hand-held devices that have high-resolution displays and

require human interaction. As more fully developed below, the claimed inventions of the '607 Patent relate to a specific configuration of conductive lines and circuit elements that make up the touch panel in a display arrangement. The '607 Patent claims recite an innovative combination of elements including the use of a mutual capacitance touch screen in a truly transparent display that can simultaneously detect and generate signals representing the specific location of distinct multiple points of actual or near contact.

28. The '607 Patent relates to a touchscreen that implements novel functions as compared to prior and contemporaneous touchscreen designs. While touchscreens had existed in various forms prior to the '607 Patent, for example resistive touchscreens, self-capacitance touchscreens, electromechanical touchscreens, optical touchscreens, and surface acoustic wave touchscreens, all prior touchscreen technologies lacked certain features or combination of features.

29. The '607 Patent discloses a transparent capacitive touch sensor that for the first time offered true multitouch sensing capability. Multitouch sensing capability is the ability to independently and unambiguously recognize and track two, three, four, five or more finger touches as well as the contact of other things like the palm of a hand. The inventors of the '607 Patent pointed out in the specification (e.g., column 1, line 63 through column 2, line 22) of their patent that the prior systems "lack the ability to track multiple points of contact simultaneously" because, for example, in such systems "an average of all simultaneously occurring touch points are determined and a single point which falls somewhere between the touch points is reported" or it was "impossible to discern the exact position of multiple touch points that fall on the same horizontal or vertical lines due to masking. In either case, faulty results are generated." Instead of these inadequate prior systems, the '607 Patent inventors developed a new transparent touch panel that (as recited in independent Claim 1) would detect multiple touches or near touches "that occur at a same time and at distinct locations" and "produce distinct signals representative of a location of the touches on the plane of the touch panel for each of the multiple touches" that can be input on the touch panel.

30. One aspect of the unique combination of claimed elements of the '607 Patent was the implementation of a special arrangement of circuit elements specifically designed to enable precise sensing of capacitive coupling in the transparent multitouch sensor called a virtual ground charge amplifier, which is exemplified in Figure 13 of the '607 Patent. A virtual ground charge amplifier includes a capacitor in a negative feedback loop around the amplifier used for detection. By virtue of there being negative feedback and ground at the non-inverting input terminal, the amplifier creates a "virtual ground" at the inverting input terminal. The term "virtual ground" is a term of art. By virtue of there being a capacitor designed into the feedback path, the circuit functions as a charge amplifier: it produces a voltage which is the time integral of the current entering at the input; the time integral of current is charge. ('607 Patent, column 17, lines 48-61.) The "virtual ground charge amplifier" allows the circuit to integrate the current per unit of time for the purpose of, for example, sensing charge on the capacitor in a manner that is robust to the impact of parasitics in the device.

IV. THE '607 PATENT CLEARLY AND UNAMBIGUOUSLY DEFINES A VIRTUAL GROUND CHARGE AMPLIFIER.

31. Dr. Von Herzen argues that additional facts have come to light since his initial Opening Report. He also argues that the purported failure of Apple to disclose the precise circuitry constituting a virtual ground charge amplifier rendered Claim 8 ambiguous. Finally, he claims that since the term "virtual ground charge amplifier" is not used in the '607 Patent specification he was unable, prior to reviewing my reports, to determine that Figure 13 of the '607 Patent corresponded to a virtual ground charge amplifier. (Von Herzen Declaration, Dkt. No. 942, ¶ 30.) I disagree with each of these arguments.

32. A person of ordinary skill in the art, after reading the '607 Patent, would have understood immediately that use of the term "virtual ground charge amplifier" in Claim 8 of the '607 Patent referred to column 17 lines 36 through 61 and the circuit depicted in Figure 13 of the patent. The '607 Patent only refers to any type of amplifier in three places: Claim 8 ("a virtual ground charge amplifier coupled to the touch panel"), Figure 13 (3:58-59 states "FIG. 13 is a

diagram of a charge amplifier, in accordance with one embodiment of the present invention"), and column 17 lines 37 through 61.

33. The concept of the "virtual ground charge amplifier is explained precisely and unambiguously in the specification (column 17, lines 47-61) with reference to Figure 13:

> FIG. 13 is a diagram of an inverting amplifier 240, in accordance with one embodiment of the present invention. The inverting amplifier 240 may generally correspond to the filter 236 shown in FIG. 12. As shown, the inverting amplifier includes a non inverting input that is held at a constant voltage (in this case ground), an inverting input that is coupled to the node and an output that is coupled to the capacitive sensing circuit 230. The output is coupled back to the inverting input through a capacitor. During operation, the input from the node may be disturbed by stray capacitance effects, i.e., parasitic capacitance. If so, the inverting amplifier is configured to drive the input back to the same voltage that it had been previously before the stimulus. As such, the value of the parasitic capacitance doesn't matter.

34. This part of the patent specification plainly states that the "noninverting input" is held constantly at ground and the "inverting amplifier is configured to drive the input back to the same voltage that it had been previously before the stimulus," namely, to ground. As everyone of even less than ordinary skill in the art knows, "ground," sometimes called "Earth" is the reference point in an electrical circuit from which other voltages are measured and is commonly a current return path to the Earth. The "virtual" part of the description "virtual ground" means that the circuit holds the voltage at a "ground" level but does not actually provide a return path for current to ground. This is a simple and direct explanation of the concept of using a "virtual ground" in the "charge amplifier."

35. Although it is not clear to me that Dr. Von Herzen read the specification of the '607 Patent carefully at all before opining about the validity of Claim 8 in his April 5, 2012 Report, I do not believe that anyone of even ordinary skill in the art, much less a purported expert, could miss the direct connection between Claim 8 and the circuit elements depicted in Figure 13 and described exactly in Column 1, lines 36 to 61 of the '607 Patent. The words "virtual ground charge amplifier" are not ambiguous and are plainly discernible to anyone of even ordinary skill in the art.

36. I also conclude that it would have been self-evident to Samsung and to Dr. Von Herzen that the accused Samsung devices (the Galaxy Tab 7.0 and 10.1 devices) included a "virtual ground charge amplifier." I understand from Apple's counsel that in its August 26, 2011 Infringement Contentions, Apple told Samsung that it believed that the "virtual ground charge amplifier" is found in the circuitry of Samsung's devices and that the specific chip in which that circuit is found would be identified in discovery. I also understand that Samsung first identified the chips used in the accused devices on March 16, 2012, in its Supplemental Response to Apple's Interrogatory No. 81. The information provided on March 16, 2012 in fact was incorrect, and Samsung revised its response on March 22, 2012, in its Second Supplemental Response to Apple's Interrogatory No. 81. I have also been informed that on the eve of the close of fact discovery, the document [redacted] was finally produced in this litigation. It was produced by Samsung as SAMNDCA10903768-783 on February 19, 2012. Attached hereto as Exhibit C is a true and correct copy of SAMNDCA10903768-783. Apple also received this document from Atmel (designated ATMEL-SAMSUNG00000286-301) on February 22, 2012. Attached hereto as Exhibit D is a true and correct copy of ATMEL-SAMSUNG00000286-301. [redacted]

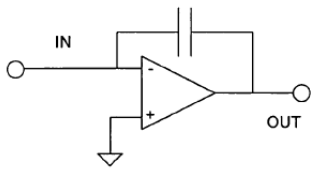


FIG. 13

37. From this information it is plain that Samsung and, with any investigation whatsoever, Dr. Von Herzen, knew full well the precise circuit in the accused devices that was the "virtual ground charge amplifier." Given these facts, I disagree with Dr. Von Herzen's contention that Apple did not sufficiently disclose the circuitry constituting a virtual ground

charge amplifier. In my March 22, 2012 Infringement Expert Report, I concluded based in part on this document, that the Accused Samsung Products contained a virtual ground charge amplifier.

38. It is therefore my opinion that Dr. Von Herzen, who holds himself out as one of more than ordinary skill in the art, and Samsung either were aware or should have been aware of the meaning of a virtual ground charge amplifier since the '607 Patent provides a clear example in its figures and specification and Samsung's products used the same circuit.

V. THE ITC DETERMINATION REGARDING THE '607 PATENT

39. My understanding is that Dr. Von Herzen is not a legal expert and has no specialized skills in interpreting the relevance or admissibility of an initial determination by the International Trade Commission. Although I understand that the ITC's Initial Determination and Opinion concerning the '607 Patent is not relevant or admissible in this action, in the event that Dr. Von Herzen is permitted to opine about that Initial Determination and Opinion before this Court or the jury, I believe that the Initial Determination and Opinion are incorrect for the same reasons I outline below in explaining how and why I think Dr. Von Herzen's conclusions and opinions are incorrect.

40. Moreover, as Dr. Von Herzen admits in paragraph 22 of his declaration, the ITC did not find the entire '607 Patent invalid. The only '607 claims before the ITC were Claims 1-7 and 10. As Dr. Von Herzen must admit, Claim 8 was not found to be invalid by the ITC.

VI. THE NEW ARGUMENTS AND PRIOR ART RAISED BY DR. VON HERZEN DO NOT DEMONSTRATE THAT CLAIM 8 OF THE '607 PATENT IS INVALID.

41. In Dr. Von Herzen's Declaration, he raises new arguments and prior art, despite the fact that expert discovery has long since closed. I have been informed that this is improper and that such material will likely be subject to objection. Moreover, I have been unable to fully consider and provide a complete opinion regarding these arguments and art in light of their tardy disclosure. Should Dr. Von Herzen ultimately be allowed to offer his opinions regarding these new arguments and art, I reserve the right to provide a supplemental expert report as is appropriate.

42. I disagree with Dr. Von Herzen's opinion in paragraph 28 of his Declaration that a virtual ground charge amplifier "is a trivial and obvious addition to the touchscreen recited in Claims 1 and 7 of the '607 Patent. Moreover, Dr. Von Herzen's opinion in paragraph 31 of his Declaration that "this precise circuitry was extremely well known in the field of electronics generally and in the field of capacitive touch screen specifically and used to filter out parasitic, or unwanted, charge coupling" is at least misleading. (Dkt. No. 942 ¶ 31.)

43. To begin with, it is important to distinguish between amplifiers, operational amplifiers and the specific circuit configuration discussed in the context of the '607 Patent shown in Figure 13 as I did in my April 16, 2012 Validity Report. (Dkt. No. 942-10 at ¶¶ 97-103.) There are literally thousands of circuit topologies that involve an amplifier, of which the virtual ground charge amplifier is one. Moreover, there are many different possible circuit topologies (some which are amplifiers and some which are not) that could potentially be used to detect changes in a capacitance of interest, such as is needed to detect changes in charge coupling of a mutual capacitance touchscreen. It is true that the specific circuit topology discussed here may have been known or used in other fields of inquiry, but it is not true that the use of this configuration was commonly used in touchscreen configurations prior to Apple's use of it in its products. The evidence for this is clear and compelling both in the patent literature and products on the market: neither the Perski '455 patent, nor Smartskin, nor Rekimoto, the primary art that Dr. Von Herzen claims is closest to the '607 Patent, conceive of using this circuit configuration to detect changes in capacitive coupling despite its *now recognized* advantages when applied to a transparent mutual capacitive touchscreens capable of true multitouch functionality.

44. The Blonder '041 patent that Dr. Von Herzen relies upon, for example, contains an operational amplifier with a capacitor in its feedback loop, but the feedback capacitor is part of a force sensor; the circuit is intended to detect changes in force on a stylus, not in any way intended to operate the touch sensor in the Blonder '041 patent. If the use of a virtual ground charge amplifier was so obvious, why did the inventors of the Blonder '041 patent not apply it, themselves, to the touch sensor? They very clearly did not and, as I explained in detail below, the instrumentation in the Blonder '041 patent system simply teaches away from doing this. Again

and again, we see that the prior art either teaches away from the virtual ground charge amplifier (*e.g.* Perski, Rekimoto, Smartskin) or uses a similar circuit in a completely different way that does not teach towards the innovation described and claimed in the '607 Patent and embodied in the Apple products.

45. In my opinion, the fact that it was known that operational amplifiers could be configured as *integrators* and used as integrators in other fields of inquiry does not, in any way, detract from the innovation of the '607 Patent in its use of a virtual ground charge amplifier as a novel way to detect changes in charge coupling in a mutual capacitance, transparent touchscreen that was robust to parasitics and enabled true multi-touch capability. This is the essence of innovation: the application of concepts in new ways to new fields of endeavor to produce novel technology and products. If this specific combination was so obvious, why does Dr. Von Herzen provide no prior art wherein a virtual ground charge amplifier was used or at least suggested for use as described in claim 8. If this was so obvious, why was Apple the first to produce such a device given the vast commercial value of multitouch devices? In the end, these arguments are nothing more than a classic and improper attempt at hindsight reconstruction of the claimed invention, using the applicant's invention as a template and selecting elements from the references to fill the gaps.

46. In paragraph 33 of his Declaration, Dr. Von Herzen claims that I admit "that the selection of a virtual ground charge amplifier was an obvious design choice well within the grasp of a circuit designer." This distorts and misstates the conclusions in the cited paragraphs 93-114 of my report which address whether the Perski reference somehow renders obvious Claim 8 of the '607 Patent. In the next six sentences of my report (Dkt. No. 942-10 ¶¶ 94-95.), which Dr. Von Herzen conveniently ignores, I stated:

> None of the Perski references includes a virtual ground charge amplifier as claimed in claim 8 of the '607 Patent. Moreover, there is no obvious path from the teachings in any of the Perski (or other) references to a virtual ground charge amplifier. There is no sensing circuitry, whether an amplifier or not, described at all for the second embodiment of the Perski '455 patent, upon which Dr. Von Herzen relies for his invalidity arguments. As such, there is no teaching whatsoever concerning the type of detector to be used with such an embodiment. I note, however, that whatever detector would be

> used, given the design of touch panel in that embodiment, it would have to handle an AC signal with differential sense lines. That type of implementation plainly teaches away from the use of a virtual ground charge amplifier.

47. Although it is true that in hindsight the '607 Patent inventors' decision to include a virtual ground charge amplifier leads to significant advantages, it was not at all obvious to make the claimed combination at the time of the invention. After the invention of the '607 Patent and the publication of the patent and the wide distribution of the very successful products that embody the invention, it is plain that Samsung has included the claimed invention to capitalize on the advantages of the claimed combination. Dr. Von Herzen's inferential jump that it therefore would have been an obvious design choice prior to the invention relies on improper hindsight.

A. None of the Asserted "Virtual Ground Charge Amplifier" Art Would Have Been Obvious To Combine To Reach The Invention of Claim 8.

1. Blonder Was Not Disclosed In Samsung's Invalidity Contentions And Would Not Have Been An Obvious Reference To Combine.

48. In paragraphs 45-51, Dr. Von Herzen discusses U.S. Patent No. 5,113,041 ("Blonder '041"). It is my understanding that although it was raised in Dr. Von Herzen's April 5, 2012 Report, the Blonder '041 patent was not included in Samsung's original invalidity contentions and that Apple intends to seek to preclude Samsung's and Dr. Von Herzen's reliance upon that reference for any purpose. Given that the Blonder '041 patent was not asserted previously with respect to the '607 Patent, Apple and I have not been afforded a full and fair opportunity to explore, investigate and pursue discovery concerning those references. To the extent the Court finds that Dr. Von Herzen may not base his opinion on the Blonder '041 patent, my opinion on this matter may be unnecessary. Also, my inclusion of a response on this reference in no way is intended as an admission that Samsung's late disclosure of them should be considered fair or permissible.

49. Contrary to Dr. Von Herzen's assertions, it would not have been obvious to include an amplifier of the type shown in Blonder '041 in the input device of the Perski '455 patent or the Smartskin paper owing both to the differences in intended purpose and the differences in the specific nature of the signals sensed by Perski and Smartskin and Blonder.

50. None of the Perski references includes a virtual ground charge amplifier as claimed in Claim 8 of the ’607 Patent. Moreover, there is no obvious path from the teachings in any of the Perski (or other) references to a virtual ground charge amplifier.

51. There is no sensing circuitry, whether an amplifier or not, described at all for the second embodiment of the Perski ’455 patent. As such, there is no teaching whatsoever concerning the type of detector to be used with such an embodiment. I note, however, that whatever detector would be used, given the design of touch panel in that embodiment, the Perski teachings are clearly built on the differential detection and differential measurement of sinusoidal signals (AC) on the sense lines. The virtual ground charge amplifier is a) not taking a differential measurement between two sense lines, b) is not configured (either in the ’607 Patent or *any other reference* provided by Dr. Von Herzen) to accept AC inputs; these circuits are all clearly driven by pulses. Combining these facts with the use of the Blonder ’041 patent stylus circuit as a force sensor –and distinctly *not* used in that patent as the multitouch detection circuitry – it is straightforward to see that it would not have been obvious to combine the stylus force detection circuit in the Blonder ’041 patent with the Perski ’455 patent.

52. Similar arguments apply to Dr. Von Herzen’s effort to combine the Blonder ’041 patent system with the Smartskin reference; it simply teaches away from the innovation of a virtual ground charge amplifier into a multitouch touchscreen. The circuitry used in the Smartskin paper is described on page 2 of that paper: “To accurately measure signals only from the transmitter electrode, a technique called ‘lock-in amplifier’ is used. This technique uses an analogue switch as a phase-sensitive detector. The transmitter signal is used as a reference signal for switching this analog switch, to enable the system to select signals that have the synchronized frequency and the phase of the transmitted signal.” (Dkt. No. 942-14.) The figure provided in the Smartskin paper is reproduced below as does not even superficially resemble a virtual ground charge amplifier (nor does it function in even remotely the same way).

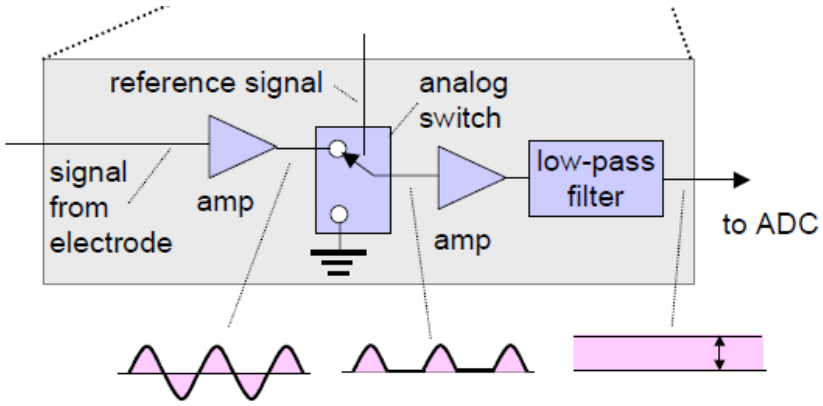


Figure 2: The SmartSkin sensor configuration: A mesh-shaped sensor grid is used to determine the hand's position and shape.

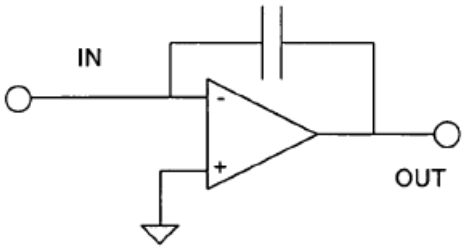
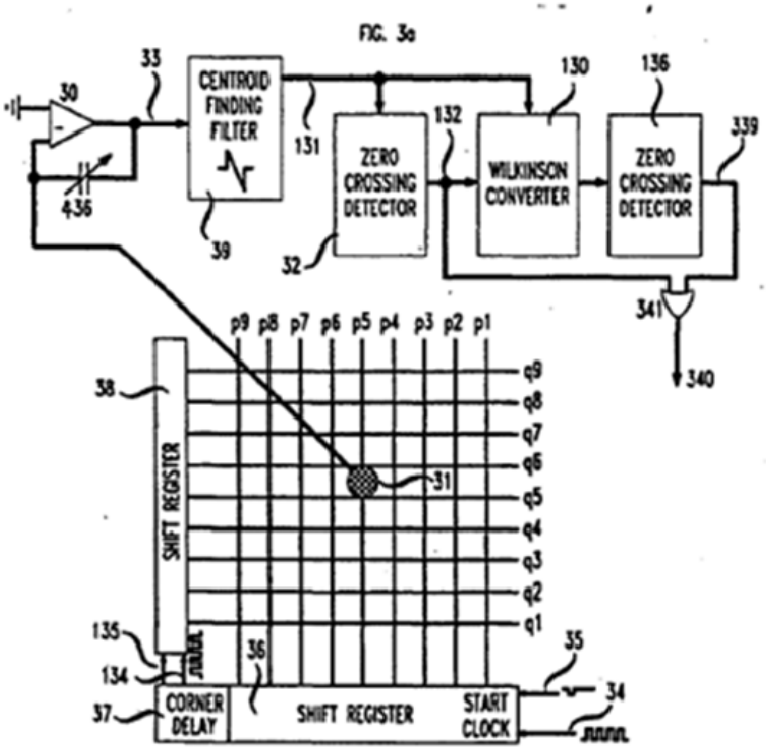


FIG. 13

53. As more fully explained in my Validity Report, fundamental topology differences exist that are obvious even to the untrained eye when examining these two circuits. For example, the Smartskin circuit requires a global reference signal against which to compare the sensed signal; the virtual ground charge amplifier does not. The Smartskin circuit requires an AC input signal; the virtual ground charge amplifier circuit described in the '607 Patent does not. (Dkt. No. 942-10 ¶¶ 168-174.) Thus, for the reasons discussed above with respect to the Perski reference, the Smartskin reference alone or in combination with any of the other cited references does not anticipate or render obvious the claimed invention of Claim 8 of the '607 Patent.

54. Someone skilled in the art and following these teachings would not choose the amplifier block in Blonder to perform the detection function in either Perski '455 or the Smartskin paper. They would choose an amplification and detection scheme which makes use of the repetitive, sinusoidal nature of the AC signal. For example, Perski '455 chooses sensing via a

differential amplifier for this purpose (and only in the third embodiment). Note that Blonder (Dkt. No. 942-12, col. 9, lns. 32-35) applies a voltage pulse to the input, not an AC signal. The use of AC signals as the inputs and sensed outputs in the Perski '455 patent and Smartskin paper actually teaches away from the use of the op-amp configuration in Blonder. Although that problem is sufficient alone for me to conclude one of ordinary skill in the art would not make such a combination, there are other problems that would have caused one of ordinary skill in the art *not* to combine Blonder '041 with the Perski or Smartskin references. In attempting to dismiss some of these distinctions, in paragraph 49 of his Declaration, Dr. Von Herzen states that "both AC and DC signals benefit equally from the use of such a charge amplifier." This misses the point entirely. Because the Blonder '041 circuit is designed to detect a different signature pulse for each drive line using an active stylus, there is simply no suggestion how these elements would be rearranged into a mutually capacitive system like Perski '455 or Smartskin.

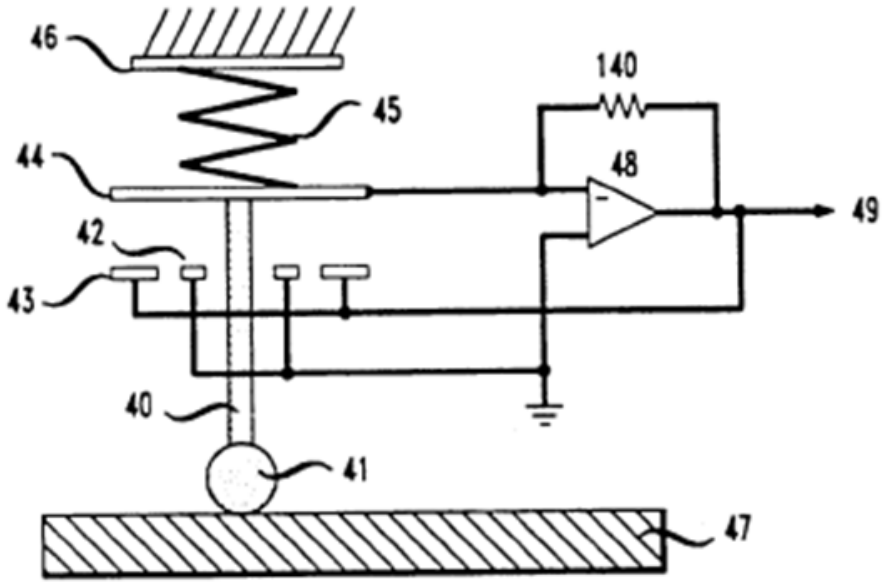


55. For example, Figure 3a of Blonder ’041 patent (above) (Dkt. No. 942-12) illustrates a tablet digitizing system incorporating an electrically active stylus connected by a wire to circuitry. The stylus is electrically connected to amplifier 30 in Figure 3a. In particular, the amplifier illustrated in Figure 3a is not connected to either the X or Y orthogonal conductive lines and thus is not “coupled to the touch panel for detecting the touches.” Instead the amplifier is connected to the stylus. In fact, the entire apparatus is intended to detect changes in the feedback capacitor (which in Blonder ’041 patent is, as described below, an electromechanical device used for detecting applied force on the stylus). This has nothing to do with and teaches away from the implementation in the ’607 Patent.

56. Furthermore, Blonder (Dkt. No. 942-12), describes a completely different and non-analogous circuit for detecting the physical movement of a spring-loaded tip in a stylus. In particular, the capacitor 436 in Figure 3a is a variable capacitor corresponding to a force-variable capacitor mechanism illustrated in Blonder ’041 patent Figure 4a reproduced below.

FIG. 4

FIG. 4a



57. The Blonder ’041 patent discloses (Dkt. No. 942-12, col. 10, ln. 52 through col. 11, ln. 7):

> A stylus design providing for force measurement responsive to capacitance change is illustrated in FIG. 4a. In the arrangement shown, stylus tip 41 is mechanically and electrically coupled by rod 40 to moving capacitor plate 44 supported by spring 45 which is, in turn, coupled in an electrically insulating manner to the stylus body 46. Bearings, not shown, help support the tip structure while allowing motion only along the axis of conductive rod 40. Plate 44 is electrically connected to the inverting input terminal of amplifier 48 while fixed plate 43 is connected to the output 49. Plates 43 and 44 form the feedback capacitor for the amplifier. Forces between the stylus body 46 and the surface of tablet 47 cause plates 43 and 44 to separate and hence increase the output signal by virtue of the increased gain of the circuit. Guard ring plate 42 enhances the effect. Resistor 140 serves to provide bias current to the amplifier input and is selected to be as large as is practical. For particular apparatus, capacitance of capacitator [sic] 43-44, varied over a range of from 10 pf to 3 pf for a contacting force within the range of from 0 to 1.5 Newtons. Other capacitor geometries and spring arrangements may be used. The present design measures the component of force along the pen axis.

58. The Blonder ’041 patent Figure 3a depicts an embodiment concerning a tablet digitizing system incorporating a wire-connected force sensing stylus incorporating a force-variable feedback capacitor 436. The design of the force sensing stylus and the force-variable capacitor are illustrated in the Blonder ’041 patent (*id.*, col. 10, lns. 52-67), which describes the design and operation of the force sensing stylus, stating,

> A stylus design providing for force measurement responsive to capacitance change is illustrated in FIG. 4a. In the arrangement shown, stylus tip 41 is mechanically and electrically coupled by rod 40 to moving capacitor plate 44 supported by spring 45 which is, in turn, coupled in an electrically insulating manner to the stylus body 46. Bearings, not shown, help support the tip structure while allowing motion only along the axis of conductive rod 40. Plate 44 is electrically connected to the inverting input terminal of amplifier 48 while fixed plate 43 is connected to the output 49. Plates 43 and 44 form the feedback capacitor for the amplifier. Forces between the stylus body 46 and the surface of tablet 47 cause plates 43 and 44 to separate and hence increase the output signal by virtue of the increased gain of the circuit.

59. In my opinion it would not have been obvious to include an amplifier of the type shown in the Blonder ’041 patent in the input device of the Perski ’455 patent or the Smartskin paper since the amplifier of the Blonder ’041 patent was designed to be used with a mechanically

variable capacitor force-sensing stylus connected by a wire to the amplifier. The capacitor at issue in Blonder is used for *force* sensing, not *position* sensing. No one of ordinary skill in the art at the time of the '607 Patent inventions would have thought that it was an obvious choice to use the amplifier attached to the stylus in Blonder as a sensing mechanism for the X or Y traces in a mutual capacitive touch sensor. Indeed, as is evident, the cited amplifier of Blonder '041 patent was not connected to the X or Y conductive lines as required by the claims of the '607 Patent. I conclude that any possible alleged resemblance of the amplifier 30 of Blonder '041 patent to the amplifier of the '607 Patent claims is incidental to the completely different system and purpose of the Blonder '041 patent and is not relevant to the '607 Patent, which, of course, does not describe a force sensing mechanical stylus. Nor would it have been obvious to include the amplifier of the Blonder '041 patent in the input device of the Perski '455 patent or Smartskin paper, which also do not describe a force sensing mechanical stylus.

60. It would not have been obvious to include an amplifier of the type shown in Blonder '041 in the input device of the Perski '455 patent or Smartskin owing both to the differences in intended purpose and the differences in the specific nature of the signals sensed in Blonder '041 and in Perski '455 or Smartskin.

61. I see no teaching or suggestion in these references or in the problem being addressed that would have lead one of ordinary skill in the art to make such a combination. Moreover, I see nothing in Dr. Von Herzen's Declaration that points to any suggestion or teaching in the art or knowledge of one of ordinary skill in the art at the relevant time to make such a combination. The fact that there are so many references cited in Dr. Von Herzen's Declaration and yet none hint or even allude to such a combination is strong proof of that conclusion, and no amount of hindsight reconstruction using the '607 Patent as a reference guide can obscure that fact.

62. Therefore it is my opinion that Blonder '041 patent does not alone or in combination disclose "a virtual ground charge amplifier coupled to the touch panel for detecting the touches on the touch panel," as claimed in Claim 8 of the '607 Patent. It is also my opinion that the use of such features in combination with the other claimed elements would not have been

obvious to one of ordinary skill in the art based on my analysis of Perski '455 patent, or any other reference cited by Dr. Von Herzen in combination with the Blonder '041 patent.

2. None Of The Other Alleged "Virtual Ground Charge Amplifiers" Invalidates The Claims And None Were Disclosed in Either Samsung's Invalidity Contentions Or Dr. Von Herzen's Report.

63. Dr. Von Herzen's Declaration presents numerous other alleged references relating to virtual ground charge amplifiers, none of which were presented in Samsung's Invalidity Contentions or Dr. Von Herzen's April 5, 2012 Corrected Report concerning the alleged invalidity of Claim 8 of the '607 Patent. In short, this is the very first time in this litigation that these invalidity arguments are being raised. I understand that Apple objects to the introduction of this new alleged prior art and the arguments relating to them as untimely and improper. Given that these references were not asserted previously with respect to Claim 8 of the '607 Patent, Apple and I have not been afforded a full and fair opportunity to explore, investigate and pursue discovery concerning those references. To the extent the Court finds that Dr. Von Herzen may not base his opinion on these references, my opinion on this matter may be unnecessary. Also, my inclusion of a response on this reference in no way is intended as an admission that Samsung's late disclosure of them should be considered fair or permissible. To the extent possible, I address each of those references briefly below in this section of my declaration.

64. In paragraphs 34 and 41, Dr. Von Herzen describes charge amplifiers used in consumer electronic devices like CCD cameras and DRAM memory and cites to the Horowitz and Hill textbook. (Dkt. No. 492.) Both of these are simply other fields of inquiry whose patent literature and product families are distinct from touchscreen and touch panels. There is a huge, decades-long literature on Dynamic Random Access Memories (DRAM) and dozens if not hundreds of product families. DRAM is used as memory elements in computers and computational devices, among other, more specialized uses. Charge couple devices (CCD's) are used primarily in imaging and, again, comprise their own distinct field of inquiry, technology base, and patent literature. These references are not pertinent simply because one of ordinary skill in the art would not look to the use of such circuits as being analogous or useful. Indeed, I see nothing in Dr. Von Herzen's declaration that would suggest otherwise. The fact that circuit

arrangements may exist in one implementation does not mean that it would be obvious to use them in another. Indeed, that is what I understand Samsung has the burden to prove. However, there are thousands of possible circuit implementations and the evidence here is not persuasive, much less clear and convincing, that of all the possible implementations of circuits this particular one would have been the obvious one to implement in the claimed invention. In fact, and as I have stated above, if this was so obvious why does Dr. Von Herzen provide no prior art wherein a virtual ground charge amplifier was used as described in Claim 8 to produce a robust multitouch touchscreen? If this was so obvious, why was Apple the first to produce such a device given the vast commercial value of multitouch devices? In the end, these arguments are nothing more than a classic and improper attempt at hindsight reconstruction of the claimed invention, using the applicant's invention as a template and selecting elements from the references to fill the gaps.

65. In paragraphs 35-36, Dr. Von Herzen describes "411" operational amplifiers configured with feedback capacitors and cites to Figures 5.25A and 5.25B of the Horowitz and Hill textbook. (Dkt. No. 942-7.) In paragraphs 37-38, Dr. Von Herzen describes filter elements and cites to Figures 5.19 and 5.20 of the Horowitz and Hill textbook. In paragraph 40, Dr. Von Herzen cites to circuit configurations from the University of Colorado's Physics 3330 curriculum. As stated above, there are literally thousands of circuit topologies that involve an amplifier, of which a virtual ground charge amplifier is one. Moreover, there are many different possible circuit topologies (some which are amplifiers and some which are not) that could potentially be used to detect changes in a capacitance of interest, such as is needed to detect changes in charge coupling of a mutual capacitance touchscreen. Horowitz and Hill –as any basic electrical engineering text does - also includes descriptions of capacitors, resistors, op amps, inductors, transistors, etc. This obviously does not preclude use of these devices in novel ways in new, patentable innovations. These references are not pertinent simply because they do not teach or even suggest to one of ordinary skill in the art to apply them to the development of the specific invention of Claim 8 of the '607 Patent, except in a convenient hindsight reconstruction.

66. I disagree with Dr. Von Herzen's conclusion in paragraph 39 based on the types of amplifiers described in paragraphs 34-38 and 40. None of these circuits teach anything about

multi-touch and there is no path to lead a designer to Claim 8 of the '607 Patent. These references are not pertinent simply because one of ordinary skill in the art would not look to the use of such circuits as being analogous or useful. Indeed, I see nothing in Dr. Von Herzen's declaration that would suggest otherwise.

67. In paragraphs 42-43 Dr. Von Herzen describes a circuit developed by Hosticka, Brodersen and Gray. This classic paper simply describes a class of MOSFET-based switched capacitor integrators; there is no notion of using these circuits for any of the purposes or applications at issue here. (Dkt. No. 942-11.) Hosticka et al. were interested in developing topologically-efficient AC filters which were frequency-selective for use in the large scale integrated (LSI) circuits of the time. Aside from the initial mention of an integrator (and depiction in Figure 2a), which Dr. Von Herzen cherry-picked, the authors state explicitly that their concern is with designing filters with low sensitivity to their filter coefficients, using up small silicon areas and requiring low performance amplifiers (Dkt. No. 942-11 at 600, col. 2, ¶ 3); these were all concerns of integrated circuit designers of the time and do not obviously inform a designer of a multitouch touchscreen. *There is no mention in the Hosticka paper of the use of this type of filter to "reduce noise in the form of parasitic capacitance"* as is incorrectly claimed by Dr. Von Herzen in paragraph 43 of his Declaration. Like the circuits described in paragraphs 34-38 and 40, the Hosticka circuits also do not teach anything about multi-touch. I therefore disagree with Dr. Von Herzen's conclusion in paragraph 44 that the incorporation of a virtual ground charge amplifier would have been a trivial addition to any capacitive touch sensor that would yield extremely predictable results. These references are not pertinent simply because one of ordinary skill in the art would not look to the use of such circuits as being analogous or useful. Indeed, I see nothing in Dr. Von Herzen's declaration that would suggest otherwise.

68. In paragraphs 52-54, Dr. Von Herzen discusses U.S. Patent No. 5,565,658 ("Gerpheide '658"). The Gerpheide '658 patent is simply an opaque, non-multitouch, mouse pointer replacement. Both the specification and claim language refer to "an object." (*See, e.g.*, Dkt. No. 942-13 at col. 10, lns. 13-16.) It does not disclose or even consider a transparent sensor that is capable of recognizing multiple simultaneous touches. No one of ordinary skill in the art

looking at the Gerpheide ’658 patent at the relevant time would have obviously conceived of a multitouch, transparent sensor as described in the ’607 Patent and claimed in Claim 8. It is only now, in hindsight, that one of ordinary skill in the art, knowing of the invention claimed in the ’607 Patent (or the myriad products that embody them) would know to combine the cited elements to create that which is disclosed in Claim 8 of the ’607 Patent.

69. Nor would one of ordinary skill in the art, looking at the Perski ’455 patent or Smartskin reference, look to the Gerpheide ’658 patent to use the cited elements from that patent. As covered in more detail below, these two references teach away from the circuits in the Gerpheide ’658 patent for multiple reasons. Dr. Von Herzen fails to provide any reasoning why one of ordinary skill, starting with the systems of the Perski ’455 patent or Smartskin would integrate portions of the Gerpheide ’658 patent’s sensing circuit. As discussed above and below, the Perski ’455 patent and Smartskin operate on different sensing principles (AC-signal detection) and it would not have been obvious to combine the systems described in those references with a virtual ground charge amplifier.

70. In paragraphs 55-56, Dr. Von Herzen discusses U.S. Patent No. 5,305,017 (“Gerpheide ’017”). To begin with, Gerpheide ’017 does not teach the virtual ground charge amplifier in the ’607 Patent nor even a simple integrator as described by Dr. Von Herzen himself. Both the relevant parts of the ’017 patent, the specification (as cited by Dr. Von Herzen) and Figure 12 (the only relevant circuit), describe a somewhat complex, multi-capacitor circuit. The charge sensing circuit is differential in nature (it requires ‘positive’ and ‘negative’ sense traces and employs what the specification calls ‘a differential charge amplifier **560**’) and, more importantly, *the ’017 patent never provides a circuit diagram for the relevant ‘differential charge amplifier.’* Moreover, the specification clearly states that the system requires not only differential AC signals (and produces an AC output), but it also requires an AC reference signal. (Dkt. No. 942-14 at 11:27-64.) None of this in any way teaches towards the circuit in the ’607 Patent, either by itself or in combination with the Perski ’455 patent or Smartskin paper.

71. Moreover, contrary to Dr. Von Herzen’s assertions, it would not have been obvious to include an amplifier of the type shown in Gerpheide ’017 in the input device of the

Perski ’455 patent or Smartskin. The Gerpheide ’017 patent is simply a mouse pointer replacement and does not disclose a transparent sensor that’s capable of recognizing multiple simultaneous touches. Dr. Von Herzen fails to provide any reasoning why one of ordinary skill, starting with the systems of the Perski ’455 patent or Smartskin would integrate portions of the Gerpheide ’017 patent’s sensing circuit. These references are not pertinent simply because one of ordinary skill in the art would not look to the use of such circuits as being analogous or useful. Indeed, I see nothing in Dr. Von Herzen’s declaration that would suggest otherwise.

B. Neither Perski Nor Smartskin Anticipate or Render Obvious Claim 8.

1. The Perski ’455 Patent Does Not Invalidate Claim 8.

72. In paragraphs 60-73 and 78-79 of his Declaration, Dr. Von Herzen provides supplemental comments regarding the Perski ’455 patent. Unlike his opinions regarding virtual ground charge amplifier, the opinions in paragraphs 60-73 and 78-79 are offered without any reason or pretext of a reason. In effect, Dr. Von Herzen has provided a new invalidity report. I understand that this violates the expert discovery schedule and disclosure requirements established by the Court. Should the Court allow Dr. Von Herzen to present his additional opinions regarding Perski, I reserve the right to provide a supplemental expert report as is appropriate.

a. The Limitations of Claim 1 Are Not Obvious or Anticipated.

73. The Perski ’455 patent does not describe, teach or suggest “A touch panel comprising a transparent capacitive sensing medium configured to detect multiple touches or near touches that occur at a same time and at distinct locations in a plane of the touch panel and to produce distinct signals representative of a location of the touches on the plane of the touch panel for each of the multiple touches,” as required by Claim 1 of the ’607 Patent.

74. The inventors of the ’607 Patent knew full well that prior efforts had been made to implement a transparent multi-touch panel but for a variety of reasons those efforts had failed. The ’607 Patent inventors developed a new transparent touch panel that (as recited in independent Claim 1) would detect multiple touches or near touches “that occur at a same time and at distinct locations” and “produce *distinct signals representative of a location of the touches on the plane of*

the touch panel for each of the multiple touches" that can be input on the touch panel. Put another way, rather than a partial or unreliable picture of the full touch panel input device, the inventors sought to create a system that would recognize the capacitive coupling associated with touch events "*at distinct points across the touch panel*" that occur "at different locations on the touch panel at a same time and to output this information to a host device *to form a pixilated image*" of the touch panel. The point of this aspect of the invention was to distinguish prior systems in which "masking" or other artifacts prevented a full multitouch capability.

75. The disclosure and claims of the Perski '455 patent are directed to a device capable of detecting both an electromagnetic stylus and a finger using two different detection modes. This central goal of the Perski '455 patent design effort pointed the authors of that patent away from a true multitouch design as set forth in the '607 Patent that includes the capability "to detect multiple touches or near touches that occur at a same time and at distinct locations in a plane of the touch panel and to produce distinct signals representative of a location of the touches on the plane of the touch panel for each of the multiple touches." The '607 Patent claims at issue are not directed to the mere detection that there are two fingers or more present on a touch sensor, they are directed to touch sensor circuitry that itself is capable of detecting and reporting the distinct location of each touch that could be made on the touch sensor. The Perski '455 patent does not enable that.

76. For example, in the abstract of the disclosure, the Perski '455 patent states that "the detector is advantageous in that the same sensing conductors can be used both for touch sensing and for detection of an electromagnetic stylus." (Dkt. No. 942-3, Perski '455 patent at Abstract.) Indeed, the sole independent claim of the Perski '455 patent is directed to two different "kinds" of position detection, not the detection of the presence of two finger touches on the touch pad. (Dkt. No. 942-3 at col. 26, lns. 1-15.) None of the claims of Perski are directed to identifying the specific location of multiple fingers and transmitting distinct signals representing each location of multiple touches. Dr. Von Herzen cites to Perski's disclosure of detecting both a finger and a stylus, but Perski discloses that the stylus contact is not detected using a mutual capacitance coupling between the drive and sense lines. Instead, the stylus is "an

Electromagnetic Stylus" (*Id.* at col. 8, lns. 57-58), which couples in via EM coupling to a single layer of traces, as per U.S. Patent Application 09/628334 "Physical Object Location Apparatus and Method and a Platform using the same" (*Id.* col. 8, lns. 59-65).

77. Moreover, it was precisely Perski's need for both the stylus and finger touch capability that led to specific weaknesses in Perski's design (from the perspective of an inventor who only wishes to build a touchscreen with no stylus). From Perski: "The present embodiments comprise a digitizer that allows finger clicks and movement detection on flat panel displays, in such a way that the same sensing infrastructure can be used for electromagnetic (EM) stylus detection." (Dkt. No. 942-3, Perski '455, col. 8, lns. 9-12). For example, because of the need to couple to the stylus, AC signals were chosen as the inputs to the traces in the touchscreen, thereby effectively forcing the inventors of Perski to build a touchscreen system that relied on sensing AC signals at the sense lines. (*Id.* at col. 8, lns. 56-65.) This posed limitations to their touchscreen implementation that the '607 Patent does not suffer from as it is unconstrained by the need to accommodate stylus input or detection. I discuss this problem in greater detail below.

78. Dr. Von Herzen notes in paragraphs 61-63 of his Declaration only that Perski can "detect" more than one finger touch at the same time, but nowhere asserts that the Perski system was capable of actually reporting distinct signals representing distinct finger locations for each of the many multi-finger touches that could be made on the sensor. As an initial matter, in describing one of the methods for implementing the second embodiment of the Perski '455 patent disclosure (the only embodiment that Dr. Von Herzen cites for multiple finger capability and the only embodiment that is at least arguably a "mutual capacitance" system that senses charge coupling between conductors), the authors of the Perski '455 patent state that "this method may lead to ambiguity on those rare occasions when multiple touches occur simultaneously at specific combinations of locations, and the larger the groups the greater is the scope for ambiguity." (Dkt. No. 942-3, col. 14, lns. 52-56.) Of course, this is the precise problem that the inventors of the '607 Patent sought to avoid.

79. After reviewing the specification and claims of Perski '455, I believe that to the extent that Perski '455 discussed the detection of multiple finger touches, it was ancillary to the

primary purpose of Perski's device. In particular, the detection of the presence of more than one finger touch is limited to the second embodiment of the invention. (Dkt. No. 942-3, Perski '455 at columns 13 and 14.) Furthermore, Perski acknowledges that certain signal mapping and initialization techniques that are proposed in the Perski '455 specification are not appropriate for multi-touch operation. (*See, e.g.*, Dkt. No. 942- 3, col. 23, lns. 25-31.) Thus, on its face, the Perski reference does not disclose or claim multi-finger sensing embodiments in the precise manner that is set forth in the '607 Patent.

80. It is further my expert opinion that the teachings in the Perski '455 patent would not have enabled a working touch panel comprising a transparent capacitive sensing medium configured to detect multiple touches or near touches at a same time and at distinct locations in a plane of the touch panel and to produce distinct signals representative of a location of the touches on the plane of the touch panel for each of the multiple touches.

81. According to the teachings in the Perski '455 patent at column 13, lines 37-43, sensing occurs in the following manner. "A finger 26 touches the sensor 20 at a certain position and increases the capacitance between the first conductor line 24 and the orthogonal conductor line 28 which happens to be at or closest to the touch position. As the signal is AC, the signal crosses by virtue of the capacitance of the finger 26 … and an output signal 30 may be detected." (Dkt. No. 942-3, col. 13, lns. 37-43.) The detection circuitry proposed in the third embodiment described in the Perski '455 patent is based on differential amplifiers (which have two inputs) connected to pairs of sense traces so as to detect voltage differences between the two inputs. Note that this third embodiment (and the only embodiment in the Perski '455 patent that even mentions any kind of amplifier) is fundamentally different from using a virtual ground charge amplifier to detect changes in current on a single sense line.

82. The configuration taught by the Perski '455 patent, and summarized above, would not have operated properly as part of a multi-touch capable touch screen display. If such a configuration were to be placed over a display, parasitic (that is, unwanted) variable capacitance coupling would have occurred between the display and the sensor and between the environment and the sensor. Different sense traces would experience different amounts of unwanted coupling

and, even worse, this coupling vary during operation. These parasitic capacitances would vary not just from sense line to sense line but could even vary between the two sense lines of each differential amplifier pair.

83. Without a proper compensation method, these variations in parasitic capacitance across the traces connected to the inputs of the differential amplifiers would generate spurious signals which create ghost touches, turn near touches into strong touches, or generally raise the noise floor of the sensor so that reliable multitouch is not possible.

84. My opinion is supported strongly by the fact that N-Trig, the assignee of the Perski '455 patent, filed subsequent patent applications in which they admit and try to address this exact problem. For example, in Patent Application Pub. No. US 2007/0268272 A1, (attached hereto as Exhibit E is a true and correct copy of Patent Application Pub. No. US 2007/0268272 A1), they write:

> **[0006]** Parasitic capacitance developed between the display screen and the conductive lines of the overlaying digitizer sensor, typically induces a current leakage into the conductive lines of the digitizer referred to as a "steady noise" and/or steady state noise. In an ideal environment, the parasitic capacitance and therefore the steady state noise level in each of the lines are expected to be identical.
>
> **[0007]** Some known systems use differential amplifiers to eliminate noise that is typically introduced on the conductive lines of the digitizer sensor. If the parasitic capacitance on each of the lines where identical, the noise can be practically eliminated using a differential amplifier. However, in practice slight differences in distance between the digitizer and screen, material structure in specific areas of the digitizer screen, environmental conditions and parasitic capacitance on associated PCB, may affect the parasitic capacitance level between the screen and some of the lines. The unbalanced capacitance creates an unbalance steady state noise level of the lines. The result is a different steady state noise on each of the lines that will result in an amplified non-zero steady state signal being produced by the differential amplifier. The presence of these steady state noises may reduce the level of accuracy possible in detecting, for example, a user's finger's location.

85. Moreover, they then directly concede (attached hereto as Exhibit F is a true and correct copy of Pat. Application Pub. No. 2004/0155871 A1) that the method for dealing with noise in the Perski '455 patent (Pat. Application Pub. No. 2004/0155871 A1) was an insurmountable problem "*that cannot be compensated for with*" the Perski '455 patent system:

> **[0008]** Incorporated U.S. Patent Application Publication No. 20040155871 additionally describes a mapping solution that may be used to compensate for the display panel steady state noise phenomenon. During an initialization procedure, magnitude and phase of the difference signals for each pair of conducting lines connected to a differential amplifier is detected and stored. Once the differential map is stored in memory, it can be used to compensate for the display panel signal steady state noise phenomenon. Noise in the signal may cause saturation when sampling the signal that cannot be compensated for with the mapping solution.

86. In other words, the engineers who worked at N-trig and developed the Perski '455 patent system themselves required substantial further experimental effort that they themselves did not consider (and I do not consider) to be "ordinary" engineering work, but rather work rising to the level of inventive engineering effort, involving multiple hardware and software innovations to produce a working device. I conclude, as they did, that the Perski '455 patent teachings were insufficient to prevent signal saturation and degraded performance to the point that the system would not be able to provide full multitouch capability, which is what is expressly required by the '607 Patent claims.

87. Lastly, it is important to state directly that this phenomenon is a substantial problem for the Perski '455 patent teachings in large part because of their design choice to employ differential amplifiers. Spatiotemporal variations in parasitic capacitance between the two terminals of each amplifier prevent full multitouch performance (as described above in the quotes from the N-Trig Patent Applications US 2007/0268272 A1). The '607 Patent teachings do not rely at all on differential measurements (*i.e.,* two sense traces are not input to each amplifier and the engineer does not need to worry that differences between these two traces might generate

erroneous detection or increased noise levels) and moreover, the virtual ground charge amplifier topology of the '607 Patent is specifically designed to be a robust and reliable solution to capacitive parasitics. This last point is now widely appreciated in the industry.

88. In summary, the Perski '455 patent (alone or together with any other reference) does not anticipate or render obvious the limitations of Claim 1, which are incorporated in Claim 8 of the '607 Patent. The Perski '455 patent does not describe, teach, suggest, or enable "A touch panel comprising a transparent capacitive sensing medium configured to detect multiple touches or near touches that occur at a same time and at distinct locations in a plane of the touch panel and to produce distinct signals representative of a location of the touches on the plane of the touch panel for each of the multiple touches," as required by the limitations of Claim 1, which are incorporated in Claim 8 of the '607 Patent.

b. Claim 8 Is Not Obvious or Anticipated.

89. In paragraph 75 of his Declaration, Dr. Von Herzen repeats his argument from his Opening Invalidity Report that because Perski '455 carries "Miller capacitance," Perski '455 qualifies as a virtual ground charge amplifier. (Dkt. No. 942.) I disagree. The Perski '455 patent does not describe, teach or suggest "The touch panel as recited in claim 7, further comprising a virtual ground charge amplifier coupled to the touch panel for detecting the touches on the touch panel," as required by Claim 8 of the '607 Patent.

90. In paragraph 71 of his April 5, 2012 Invalidity Report, Dr. Von Herzen states: "Inherent in many charge amplifiers is associated Miller capacitance, which is the capacitance between the input and the output of the operational amplifier. Absent other feedback, it is the Miller capacitance that provides the capacitive feedback that makes an op-amp respond as a charge amplifier. The Miller theorem states that the Miller capacitance can be treated as an equivalent pair of capacitors to ground, providing a virtual ground circuit." (Dkt. No. 942-16 ¶71.) The intent of this statement appears to be to lead the reader to conclude that because there exists some capacitance between the input and output of *any* operational amplifier, any operational amplifier is a virtual ground charge amplifier even in the absence of a specifically engineered feedback loop containing a capacitor. This is highly misleading for several reasons.

91. The capacitor in the ’607 Patent virtual ground charge amplifier allows the circuit to integrate the current per unit of time for the purpose of, for example, sensing charge on the capacitor in a manner that is robust to the impact of parasitics in the device. That design innovation was important in enabling full multitouch capability in a transparent touch sensor. This specific arrangement of circuit elements was specifically designed by the engineers and is represented by specific diagrams that set forth that design, as shown, for example, in Figure 13 of the ’607 Patent.

92. It is understood that circuit diagrams serve as a technical language for electrical engineers. When engineers draw an open loop amplifier, one intends to convey the absence of a feedback loop. When an engineer draws a differential amplifier one intends to convey the differential nature of the input of that amplifier. In the field of electrical engineering, the innovations and teachings may be conveyed by the specific drawings; they are abstractions that convey *specific* meaning to those skilled in the art. For example, when an engineer draws a capacitor in a circuit, she is abstracting the phenomenon that causes capacitance (energy storage due to the electric field between conductors) into that symbol. Those of ordinary skill in the art know that all *real* capacitors happen to have resistive leakage paths between their terminals. One would not, however, retroactively claim that every capacitor drawn in every patent diagram necessarily includes a resistor. Such a position transforms every operational amplifier into a charge amplifier, which is clearly an untenable position. One of ordinary skill in the art would not believe that an engineering drawing or schematic (like one found in a patent) of an “op-amp” alone would teach that the engineer intended some incidental Miller capacitance to function as a virtual ground charge amplifier in the operation of the circuit. That argument renders the words “virtual ground” and “charge amplifier” to be completely meaningless. In the real world, they are not meaningless and they require different structures and circuit designs to implement. Dr. Von Herzen is simply ignoring those realities.

93. As a corollary to this, one must keep in mind that the presence of a drawn capacitor in the feedback loop of the virtual ground charge amplifier in the ’607 Patent (and in any similar technical drawing) very obviously implies that the designer has control over this

capacitor. In other words, to design a working, functional detector circuit, one must choose specific capacitor values (in the context of designing mutual capacitance detector circuits, one must choose this capacitance based on information about the capacitance at the nodes of the touchscreen, the known parasitic capacitance, etc.). Thus, from the perspective of the technical drawings, if an engineer *were* to use an internal capacitance coupling in feedback for the purposes of detecting a capacitance change at a mutual capacitance node, then she is following the teachings of the '607 Patent, regardless of the source of that capacitor. The drawn abstract representation of this (*i.e.* the circuit diagram) would necessarily be a drawn amplifier with a drawn capacitor in a feedback loop (as in the '607 Patent), not simply a drawn amplifier without a drawn feedback loop (as in the other references presented by Dr. Von Herzen).

94. In addition to this problem with Dr. Von Herzen's presentation, it is also untrue in practice that the capacitance between output and input present in a well-designed operational amplifier renders it a useful charge amplifier. To one of ordinary skill in the art, a typical operational amplifier is designed with multiple transistor stages so that this type of effect is *minimized*. The reason is straightforward (and related to the first explanation above): an operational amplifier supplier does not want the op-amp to contain elements that force a strong, unwanted feedback loop to be present within the op-amp and rendering all op amps into strong charge integrators at the frequencies of interest. The design of the feedback loop is left to the circuit designer, who adds additional components (whether in layout or around the op-amp IC) to create it. In summary, absent an engineering effort to the contrary, the small amount of capacitance between input and output does not allow for a substantial amount of feedback (certainly not to establish a virtual ground at the frequencies of interest) and a strong charge integrator effect is actively *minimized* in normal operational amplifier design.

95. Consequently, I disagree with and find no engineering support for Dr. Von Herzen's assertion in paragraph 75 of his Declaration that "Perski '455 inherently carries 'Miller capacitance," which is mathematically identical to a pair of capacitors to ground, providing a virtual ground to the charge amplifier. In my opinion, operational amplifier 74 of Perski '455 qualifies as a 'virtual ground charge amplifier' under the plain and ordinary meaning of the term."

96. The cited phenomenon of Miller capacitance provides a feedback path for the output of the amplifier. It is true that the capacitor value can be treated as an equivalent pair of capacitors to ground *but* to include the effect of the feedback loop we must also include a dependent current source (see below). That is to say, a circuit which simply contains capacitors at the input of an op-amp with no feedback loop and no Miller dependent current source drawn *is not equivalent* to a circuit with a capacitor designed into the feedback loop. Thus, all of the amplifiers in the cited Perski references, which only contain capacitors *at the input*, cannot be considered virtual ground charge amplifiers simply by invocation of the Miller theorem in the absence of any other information explaining that the amplifier was intended to be configured to function and does function in the circuit in this way (as explained in my first point above). I therefore disagree with Dr. Von Herzen's conclusion that the Perski '455 patent is a virtual ground charge amplifier. It is clear that the authors of the Perski '455 patent did not use any alleged "Miller capacitance" for "detecting touches." Thus it is irrelevant to Claim 8.

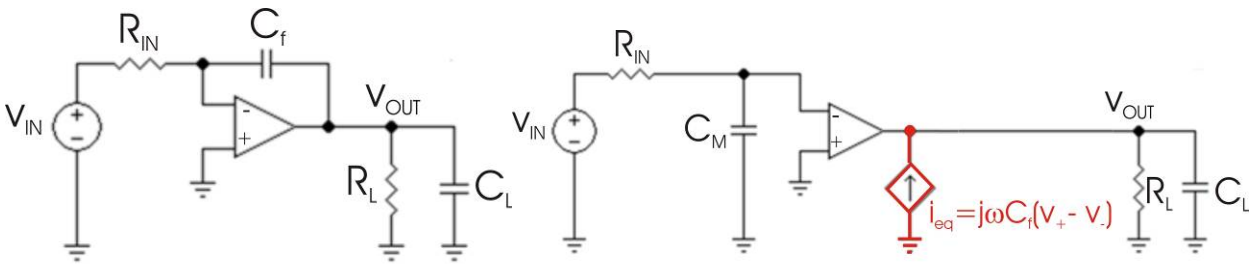


Figure (left) Circuit with a capacitor in feedback; (right) circuit highlighted required dependent current source.

97. I also disagree with his conclusion in paragraph 77 of his Declaration that it would have been obvious to combine a virtual ground charge amplifier with the system of the Perski '455 patent. In particular, I disagree with his conclusions with respect to the alleged virtual ground charge amplifier prior art (Dkt. No. 942 ¶¶ 28-57), even assuming Dr. Von Herzen were correct in his description of that art. In my Report and in several places above, I give very specific reasons why Perski '455 teaches away from the virtual ground charge amplifier. In brief, these include the differential nature of the Perski '455 sensor lines; the use of AC signals in that

differential arrangement and the differential AC circuit provided in the third embodiment; and the strong evidence from subsequent patent filings by the inventors of Perski '455 that the Perski '455 system is not robust to changes in parasitics. Thus, Perski '455 neither teaches a virtual ground charge amplifier nor provides an obvious reason to include one given their design choices.

98. In paragraph 77 of his Declaration, Von Herzen also makes a number of misleading remarks based on quotes from Perski '455 patent intended to imply that one skilled in the art would want to include a virtual ground charge amplifier into the Perski '455 patent system. He states that "Perski '455 itself already acknowledges that there is a certain amount of noise or 'parasitic capacitance' associated with the overlapping conductors. Perski '455 then teaches that [i]n a preferred embodiment, the detector actually learns the amount of parasitic current transfer for each parasitic junction and subtracts this value from the sampled signals'…. As such, the Perski '455 patent itself provides the motivation for one of ordinary skilled in the art to use the precise amplifier configuration shown in any of the Blonder reference…" (Dkt. No. 942 ¶ 77.) The Perski '455 patent teachings (and subsequent patent filings by the inventors) *actually teach away from this*. In the Perski '455, it is claimed that the issue of unwanted signals resulting from changes in parasitics can be dealt with via a calibration procedure which has absolutely nothing to do with a virtual ground charge amplifier and instead is a 'mapping solution' or procedure for dealing with the problem. (Dkt. No. 942-3, Perski '455 col. 20 ln. 54 through col. 22, ln. 53.) Thus, the original patent unequivocally teaches away from using a virtual ground charge amplifier. However, if one takes this even further, one finds – as I stated in my expert Report – that the inventors of the Perski '455 patent found this method to be insufficient, rendering the device inoperable. In Patent Application US2007/0268272A1 (attached hereto as Exhibit E is a true and correct copy of Patent Application US2007/0268272A1), they directly concede that the method for dealing with noise in the Perski '455 patent (U.S. Pat. Application No. 20040155871) was an insurmountable problem "*that cannot be compensated for with*" the Perski '455 patent system:

> **[0008]** Incorporated U.S. Patent Application Publication No. 20040155871 additionally describes a mapping solution that may be used to compensate for the display panel steady state noise phenomenon. During an initialization procedure, magnitude and phase of the difference signals for each pair of conducting lines connected to a differential amplifier is detected and stored. Once the differential map is stored in memory, it can be used to compensate for the display panel signal steady state noise phenomenon. Noise in the signal may cause saturation when sampling the signal that cannot be compensated for with the mapping solution.

99. Thus, not only does the Perski '455 system, as described, likely not work in the face of parasitics (something the virtual ground charge amplifier addresses), when pressed for a solution, the inventors of Perski filed further patent applications *none of which included a virtual ground charge amplifier*. If it was so obvious to include a virtual ground charge amplifier, why did the inventors of the Perski '455 patent, themselves the most versed engineers in their particular system, not include the virtual ground charge amplifier?

100. Particularly instructive on this point is the incompatibility of the Perski '455 system with the Blonder reference that Dr. Von Herzen focuses on paragraphs 45 through 51 of his Declaration. Contrary to Dr. Von Herzen's assertions, it would not have been obvious to include an amplifier of the type shown in Blonder '041 in the input device of the Perski '455 patent owing both to the differences in intended purpose and the differences in the specific nature of the signals sensed by Perski and Blonder.

101. The Perski patent teaches detection by AC coupling. The Perski teachings are clearly built on the detection and measurement of sinusoidal signals (AC) on the sense lines. Someone skilled in the art and following these teachings would not choose the amplifier block in Blonder to perform this detection. They would choose an amplification and detection scheme which makes use of the repetitive, sinusoidal nature of the AC signal. Perski chooses sensing via a differential amplifier for this purpose (in the third embodiment). Note that Blonder (Dkt. No. 942-12 at col. 9, lns. 32-35) applies a voltage pulse to the input, not an AC signal. The use of AC signals as the inputs and sensed outputs in the Perski patent actually teaches away from the use of the op-amp configuration in Blonder. Although that problem is sufficient alone for me to

conclude one of ordinary skill in the art would not make such a combination, there are other problems that would have caused one of ordinary skill in the art *not* to combine Blonder '041 with the Perski reference. In attempting to dismiss some of these distinctions, in paragraph 49 of his Declaration, Dr. Von Herzen states that "both AC and DC signals benefit equally from the use of such a charge amplifier." This misses the point entirely. Because the Blonder circuit is designed to detect a different signature pulse for each drive line using an active stylus, there is simply no suggestion how these elements would be rearranged into a mutually capacitive system like Perski.

102. For example, as shown in my earlier discussion above, Figure 3a of Blonder '041 patent illustrates a tablet digitizing system incorporating an electrically active stylus connected by a wire to circuitry. The stylus is electrically connected to amplifier 30 in Figure 3a. In particular, the amplifier illustrated in Figure 3a is not connected to either the X or Y orthogonal conductive lines and thus is not "coupled to the touch panel for detecting the touches." Instead the amplifier is connected to the stylus. In fact, the entire apparatus is intended to detect changes in the feedback capacitor (which in the Blonder '041 patent is, as described below, an electromechanical device used for detecting applied force on the stylus). This has nothing to do with and teaches away from the implementation in the '607 Patent.

103. Furthermore, Blonder describes a completely different and non-analogous circuit for detecting the physical movement of a spring-loaded tip in a stylus. In particular, the capacitor 436 in Figure 3a is a variable capacitor corresponding to a force-variable capacitor mechanism illustrated in Blonder '041 patent Figure 4a, as discussed in my earlier explanation of Blonder.

104. The Blonder '041 patent discloses (Dkt. No. 942-12, col. 10, ln. 52 through col. 11, ln. 7):

> A stylus design providing for force measurement responsive to capacitance change is illustrated in FIG. 4a. In the arrangement shown, stylus tip 41 is mechanically and electrically coupled by rod 40 to moving capacitor plate 44 supported by spring 45 which is, in turn, coupled in an electrically insulating manner to the stylus body 46. Bearings, not shown, help support the tip structure while allowing motion only along the axis of conductive rod 40. Plate 44 is electrically connected to the inverting input terminal of amplifier 48 while fixed plate 43 is connected to the output 49. Plates 43 and 44 form the feedback capacitor for the amplifier. Forces between the stylus body 46 and the surface of tablet 47 cause plates 43 and 44 to separate and hence increase the output signal by virtue of the increased gain of the circuit. Guard ring plate 42 enhances the effect. Resistor 140 serves to provide bias current to the amplifier input and is selected to be as large as is practical. For particular apparatus, capacitance of capacitator [sic] 43-44, varied over a range of from 10 pf to 3 pf for a contacting force within the range of from 0 to 1.5 Newtons. Other capacitor geometries and spring arrangements may be used. The present design measures the component of force along the pen axis.

105. The Blonder '041 patent Figure 3a depicts an embodiment concerning a tablet digitizing system incorporating a wire-connected force sensing stylus incorporating a force-variable feedback capacitor 436. The design of the force sensing stylus and the force-variable capacitor are illustrated in the Blonder '041 patent, which describes the design and operation of the force sensing stylus, stating (*id.* at col. 10, lns. 52-67),

> A stylus design providing for force measurement responsive to capacitance change is illustrated in FIG. 4a. In the arrangement shown, stylus tip 41 is mechanically and electrically coupled by rod 40 to moving capacitor plate 44 supported by spring 45 which is, in turn, coupled in an electrically insulating manner to the stylus body 46. Bearings, not shown, help support the tip structure while allowing motion only along the axis of conductive rod 40. Plate 44 is electrically connected to the inverting input terminal of amplifier 48 while fixed plate 43 is connected to the output 49. Plates 43 and 44 form the feedback capacitor for the amplifier. Forces between the stylus body 46 and the surface of tablet 47 cause plates 43 and 44 to separate and hence increase the output signal by virtue of the increased gain of the circuit.

106. In my opinion it would not have been obvious to include an amplifier of the type shown in Blonder '041 in the input device of the Perski '455 patent since the amplifier of Blonder '041 was designed to be used with a mechanically variable capacitor force-sensing stylus

connected by a wire to the amplifier. The capacitor at issue in Blonder is used for *force* sensing, not *position* sensing. No one of ordinary skill in the art at the time of the '607 Patent inventions would have thought that it was an obvious choice to use the amplifier attached to the stylus in Blonder as a sensing mechanism for the X or Y traces in a mutual capacitive touch sensor. Indeed, as is evident, the cited amplifier of Blonder '041 patent was not connected to the X or Y conductive lines as required by the claims of the '607 Patent. I conclude that any possible alleged resemblance of the amplifier 30 of Blonder '041 patent to the amplifier of the '607 Patent claims is incidental to the completely different system and purpose of the Blonder '041 patent and is not relevant to the '607 Patent, which, of course, does not describe a force sensing mechanical stylus. Nor would it have been obvious to include the amplifier of the Blonder '041 patent in the input device of the Perski '455 patent, which also does not describe a force sensing mechanical stylus.

107. It would not have been obvious to include an amplifier of the type shown in Blonder '041 in the input device of the Perski '455 patent owing both to the differences in intended purpose and the differences in the specific nature of the signals sensed in Perski '455 and Blonder '041.

108. I see no teaching or suggestion in these references or in the problem being addressed that would have lead one of ordinary skill in the art to make such a combination. Moreover, I see nothing in Dr. Von Herzen's Declaration that points to any suggestion or teaching in the art or knowledge of one of ordinary skill in the art at the relevant time to make such a combination. The fact that there are so many references cited in Dr. Von Herzen's Declaration and yet none hint or even allude to such a combination is strong proof of that conclusion, and no amount of hindsight reconstruction using the '607 Patent as a reference guide can obscure that fact.

109. Therefore it is my opinion that neither the Blonder '041 patent nor any of the other art alone or in combination discloses the invention recited in Claim 8 of the '607 Patent. It is also my opinion that the use of such features in combination with the other claimed elements would not have been obvious to one of ordinary skill in the art based on my analysis of Perski '455 patent and the other references cited by Dr. Von Herzen.

c. The "Other Limitations" Arguments Are New.

110. In paragraph 78-79 of his Declaration, Dr. Von Herzen refers to arguments made in his rebuttal non-infringement report from April 16, 2012. In that report, Dr. Von Herzen raised arguments regarding "near touches" and "lines." These opinions were not in Dr. Von Herzen's Corrected Invalidity Report from April 5, 2012. (Dkt. No. 942-16.) Dr. Von Herzen now seeks to rewrite his Invalidity Report to include these new arguments based on new claim construction asserts first raised in his later rebuttal non-infringement report.

111. In paragraph 78 of his Declaration, Dr. Von Herzen provides a quote from the Perski '455 patent that purports to show that the Perski '455 patent describes near touches. As a preliminary matter, Dr. Von Herzen is construing the phrase "or near touches" to mean "and near touches." This improper claim construction was first disclosed in Dr. Von Herzen's April 16, 2012 Non-Infringement Report and *not* Dr. Von Herzen's April 5, 2012 Corrected Invalidity Report. This claim construction is clearly incorrect. Claim 1 of the '607 Patent plainly recites a "touch panel comprising a transparent capacitive sensing medium configured to detect multiple touches *or* near touches." (Exhibit B hereto, emphasis added.) In other words, under the plain meaning of this phrase, either near touches or actual touches is sufficient to meet the limitation. I see nothing in the specification or in the prosecution history that compels any different reading of the term "or." It does not mean "and" in this context. (I also understand that Apple has filed a motion to strike Samsung's non-infringement theory that it does not infringe since it does not detect multiple touches and near touches since this theory was never properly disclosed.) Notwithstanding Dr. Von Herzen's improper claim construction, the quotation provided by Dr. Von Herzen in paragraph 78 of his declaration *describes the operation of the stylus, not finger touches* and nowhere does the Perski '455 patent indicate or describe finger near touches nor is the quote provided by Dr. Von Herzen applicable to finger touches.

112. Similarly, Dr. Von Herzen raises a new claim construction theory for invalidity purposes in paragraph 79. Dr. Von Herzen asserts that the claim language of claim 1 (which is incorporated into claim 8) requiring that "the capacitive monitoring circuitry is configured to detect changes in charge coupling between the first conductive lines and the second conductive

lines" requires "driving multiple lines simultaneously while sensing on multiple lines." (Dkt. No. 942 ¶ 79.) This is plainly incorrect as a matter of plain meaning and in light of the teachings in the '607 Patent. First, there is nothing in the cited claim language that requires driving multiple conductive lines simultaneously while sensing multiple conductive lines simultaneously. The plain meaning of the claim words is only that the "capacitive monitoring circuitry is configured changes in charge coupling between the first conductive lines and the second conductive lines," and it is not limited to any particular timing of how those lines are driven or sensed. As long as the capacitive monitoring circuitry operates to detect charge coupling at each of the operative junctions between the drive and sense lines, the limitation is met. Moreover, the '607 Patent teaches driving only one drive line at a time, not multiple lines as Dr. Von Herzen's misconstruction would require. (*See, e.g.,* Exhibit B hereto, '607 Patent, column 5, lines 62-65 ("During operation, a current is driven through one driving line at a time, and because of capacitive coupling, the current is carried through to the sensing lines at each of the nodes (e.g., intersection points).") Thus, under Dr. Von Herzen's misreading of the plain claim terms, the structures disclosed in the '607 Patent do not meet the claims. This cannot be a reasonable construction of the claim. In any event, the portion of the Perski '455 patent to which Dr. Von Herzen cites for a method of driving and sensing multiple lines at the same time would clearly not permit any time of detection of multitouch (much less reporting of information specifying distinct locations of multiple touches). The Perski '455 patent states,"[h]owever, this method may lead to ambiguity on those rare occasions when multiple touches occur simultaneously at specific combinations of locations, and the larger the groups the greater is the scope for ambiguity." (Dkt. No. 942-3 at 14:52-56.) Thus, Dr. Von Herzen's reliance on this portion of the Perski '455 patent merely underscores that that reference would not have been capable of meeting the limitations of claim 1 (and thus Claim 8) of the '607 Patent even under Dr. Von Herzen's misconstruction of the claim phrase "wherein the capacitive monitoring circuitry is configured to detect changes in charge coupling between the first conductive lines and the second conductive lines" requires "driving multiple lines simultaneously while sensing on multiple lines."

2. The Smartskin Paper Does Not Invalidate Claim 8.

113. In paragraphs 82-93 and 95-97 of his Declaration, Dr. Von Herzen provides supplemental comments regarding the Smartskin reference. Unlike his opinions regarding virtual ground charge amplifier, the opinions in paragraphs 82-93 and 95-97 are offered without any reason or pretext of a reason. In effect, Dr. Von Herzen has provided a reply report. I understand that this violates the expert discovery schedule established by the Court. Should the Court allow Dr. Von Herzen to present his additional opinions regarding Smartskin, I reserve the right to provide a supplemental expert report as is appropriate.

a. The Limitations of Claim 1 Are Not Obvious or Anticipated.

114. As an initial matter, I note that the Smartskin paper was presented to the United States Patent and Trademark Office during prosecution of the '607 Patent and all of the claims of the issued '607 Patent were granted after the patent examiner reviewed the Smartskin paper. This is plain from the prosecution history documents and from the issued '607 Patent, which lists the Smartskin paper as the third non-patent related publication in the "Other Publications" portion of the "References Cited" section of the patent.

115. Smartskin does not describe "A touch panel comprising a transparent capacitive sensing medium configured to detect multiple touches or near touches that occur at a same time and at distinct locations in a plane of the touch panel and to produce distinct signals representative of a location of the touches on the plane of the touch panel for each of the multiple touches," or the "plurality of transparent first conductive lines" or the "plurality of transparent second conductive lines," as required by Claim 1 of the '607 Patent.

116. The Smartskin paper does not describe a "transparent capacitive sensing medium." Instead, the Smartskin paper describes two touch sensing prototypes. The first prototype is a wooden table approximately 1 meter on each side with a plywood board cover. (Dkt. No. 942-4 at 2-4.) The second prototype is an opaque printed circuit board approximately 0.3 by 0.2 meters in size. (*Id.* at 4.) Neither of the prototypes in the Smartskin paper demonstrates a transparent capacitive sensing medium. The Smartskin paper identifies "Use of transparent electrodes" as a "Direction for Future Work" but does not demonstrate a "transparent capacitive sensing

medium." The author states in his concluding section entitled "Conclusion and Directions for Future Work," that "A transparent Smartskin sensor can be obtained by using Indium-Tin Oxide (ITO) or a conductive polymer. This sensor can be mounted in front of a flat panel display or on a rear-projection screen." (*Id.* at 7.)

117. Smartskin does not enable "A touch panel comprising a transparent capacitive sensing medium configured to detect multiple touches or near touches that occur a same time and at distinct locations in a plane of the touch panel and to produce distinct signals representative of a location of the touches on the plane of the touch panel for each of the multiple touches," because modifying Smartskin's sensor to use ITO lines would have required a substantial degree of experimentation by one of ordinary skill. In particular, adapting the copper-wire system of Smartskin to use high-impedance ITO traces would have been extremely problematic.

118. As an illustrative example, consider that the sheet resistance of a typical 1 oz copper trace is approximately 0.45 milliohms per square area and that the sheet resistance of ITO with 90% transmissivity is approximately 50 ohms per square area. Switching from copper traces to ITO, using these typical values, would result in an increase of sheet resistance of over 100,000 times. Such a large change in the electrical resistance of the sensor lines would have a detrimental impact on the performance and operability of the Smartskin sensor in many ways, *regardless* of whether the value is 100,000x worse (as in my calculation that Dr. Von Herzen criticizes) or 1,000x worse (as per the calculation now provided by Dr. Von Herzen in paragraph 88 of Dkt. No. 942).

119. For example, Smartskin uses a phase-locking amplifier to isolate and detect AC "wave signals." (*See, e.g.*, Dkt. No. 942- 4, Smartskin, page 2, paragraph 2, and Figure 2.) Changing from copper transmission lines to ITO would dramatically increase the resistance of the lines and, as admitted by Dr. Von Herzen himself, slow down the response of the device. This slow down would introduce a phase shift between the "signal from the electrode" and the "reference signal" common to all the receiver blocks (*Id.* at Figure 2). This is a crucial point as Smartskin requires a common sinusoidal reference signal arriving at each of the row detectors against which the detector compares the measured signal. Dr. Von Herzen himself arrives at the

conclusion that the transition to ITO could introduce a 1 μs time constant into the ITO lines. (Dkt. No. 942 ¶ 88.) Regardless of what slowdown this would produce in the sense line response, this would introduce cascading phase shifts from row to row in the reference signal; consider that the total refresh time (the time required to read the entire touchscreen) of a typical tablet multitouch touchscreen is usually < 10 – 15 milliseconds. If this reference signal differs from row to row by a phase shift the detection scheme will not operate as described. Dr. Von Herzen seems to miss this point when he states that Smartskin "actually uses phase shifts to achieve its objectives." (Dkt. No. 942 ¶ 89.) Smartskin uses phase shifts between the reference signal and the sensed signal. Smartskin does *not* contemplate having a reference signal with different phase shifts for different sense lines and, thus, the Smartskin lock-in amplifier detection circuit described in the Smartskin paper would be rendered inoperable.

120. The additional resistance due to the change from copper to ITO would also increase the external noise sensitivity of the Smartskin sensor. In fact, Smartskin recognizes the existence of external noise sources and proposes the lock-in amplifier as a solution. (Dkt. No. 942-4, Smartskin paper at page 2, column 2.) However, for at least the problems noted with phase shifting discussed above, the change from copper to ITO may have also rendered the lock-in amplifier circuit, and Smartskin's noise solution, inoperable.

121. The point is that modifying the Smartskin technology to create a transparent touchscreen like that taught by the '607 Patent would have required significant experimentation by one of ordinary skill to arrive at a solution and there would have been no predictable way of knowing whether such a person would have arrived at a workable solution. Indeed, one of ordinary skill in the art facing this cascade of technical problems would have been discouraged from pursuing a solution like the virtual ground charge amplifier at all.

122. In summary, the Smartskin patent does not anticipate or render obvious the transparent, capacitive sensing medium or transparent conductive line limitations of Claim 1 of the '607 Patent. It uses sensing circuitry completely unrelated to the virtual ground charge amplifier, instead relying on phase locking between an AC signal on the sense line (whose phase is shifted by the change in charge coupling caused by a touch) and a reference AC signal. These

circuits and the specific design choices they entail teach away from the virtual ground charge amplifier described in the '607 Patent. Smartskin does not describe any transparent or translucent devices; all devices described are large, opaque and rely on copper wires or traces. Despite a brief mention of the possibility of converting these systems to transparent, ITO systems, it teaches nothing about how to do this and, moreover, it is my opinion that doing so would have required undo experimentation due to the electrical differences arising from the use of ITO versus copper.

b. Claim 8 Is Not Obvious or Anticipated.

123. I disagree with Dr. Von Herzen's opinion in paragraph 94 of his Declaration that one of ordinary skill in the art would have been motivated to include a charge amplifier into Smartskin's detector.

124. The Smartskin reference does not describe, teach or suggest "The touch panel as recited in claim 7, further comprising a virtual ground charge amplifier coupled to the touch panel for detecting the touches on the touch panel," as required by Claim 8 of the '607 Patent.

125. In Smartskin, the circuitry used is described on page 2 of that paper: "To accurately measure signals only from the transmitter electrode, a technique called 'lock-in amplifier' is used. This technique uses an analogue switch as a phase-sensitive detector. The transmitter signal is used as a reference signal for switching this analog switch, to enable the system to select signals that have the synchronized frequency and the phase of the transmitted signal." (Dkt. No. 942-4.) The figure provided in the Smartskin paper, as reproduced below, does not even superficially resemble a virtual ground charge amplifier (nor does it function in even remotely the same way).

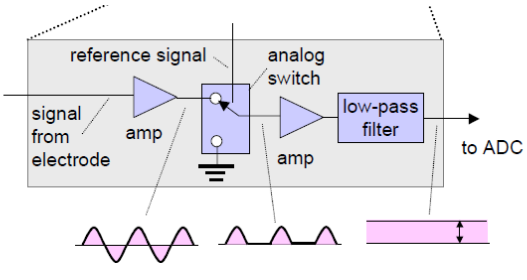


Figure 2: The SmartSkin sensor configuration: A mesh-shaped sensor grid is used to determine the hand's position and shape.

126. Fundamental topology differences exist that are obvious even to the untrained eye; for example, the Smartskin circuit requires a global reference signal against which to compare the sensed signal, virtual ground charge amplifier does not; the Smartskin circuit requires an AC input signal, the '607 Patent does not.

127. In his Declaration, Dr. Von Herzen refers to Smartskin's use of a "lock-in amplifier." (Dkt. No. 942 ¶ 89.) However, he does not attempt to argue that this amplifier constitutes a virtual ground charge amplifier. (*Id.* at ¶¶ 89, 94.) Nor can he. Page 2 of the Smartskin paper states: "To accurately measure signals only from the transmitter electrode, a technique called 'lock-in amplifier' is used. This technique uses an analogue switch as a phase-sensitive detector. The transmitter signal is used as a reference signal for switching this analog switch, to enable the system to select signals that have the synchronized frequency and the phase of the transmitted signal." This says nothing about a virtual ground charge amplifier. As more fully explained above, even fundamental topology differences exist in the diagram that are obvious to the untrained eye; for example, the virtual ground charge amplifier does not require any reference signal against which to compare the sensed signal. For the reasons discussed above with respect to the Perski reference, Dr. Von Herzen is wrong to conclude that any amplifier, such as a lock-in amplifier can be called a virtual ground charge amplifier. They are different circuits that perform different functions for very different reasons. Dr. Von Herzen simply ignores these facts. The Smartskin reference alone or in combination with any of the other cited references does not anticipate or render obvious the claimed invention of Claim 8 of the '607 Patent for the same reasons outlined above.

128. Therefore it is my opinion that the Smartskin paper and the other cited references in combination with the Smartskin paper do not alone or in combination not disclose "a virtual ground charge amplifier coupled to the touch panel for detecting the touches on the touch panel," as claimed in Claim 8 of the '607 Patent.

129. For the reason stated above with respect to the Perski reference, it is also my opinion that the use of such features would not have been obvious to one of ordinary skill in the art based on my analysis of the Smartskin paper, or any other reference cited by Dr. Von Herzen, including the Blonder '041 patent. It would not have been obvious to include an amplifier of the type shown in Blonder '041 in the input device of the Smartskin paper owing both to the differences in intended purpose and the differences in the specific nature of the signals sensed in Smartskin and Blonder '041. I see no teaching or suggestion in these references or in the problem being addressed that would have lead one of ordinary skill in the art to make such a combination. Moreover, I see nothing in Dr. Von Herzen's Declaration that points to any suggestion or teaching in the art or knowledge of one of ordinary skill in the art at the relevant time to make such a combination. The fact that there are so many references cited in Dr. Von Herzen's Declaration and yet none hint or even allude to such a combination is strong proof of that conclusion, and no amount of hindsight reconstruction using the '607 Patent as a reference guide can obscure that fact.

130. Therefore it is my opinion that the Smartskin paper application and the other cited references in combination with the Smartskin paper do not alone or in combination not disclose "a virtual ground charge amplifier coupled to the touch panel for detecting the touches on the touch panel," as claimed in Claim 8 of the '607 Patent. It is also my opinion that the use of such features would not have been obvious to one of ordinary skill in the art based on my analysis of the Smartskin paper, or any other reference cited by Dr. Von Herzen in combination with the Smartskin paper.

c. The "Other Limitations" Arguments Are New.

131. In paragraph 95-96 of his Declaration, Dr. Von Herzen refers to arguments made in his rebuttal non-infringement report from April 16, 2012. In that report, Dr. Von Herzen raised for the first time new claim construction arguments regarding "near touches" and "lines." These opinions were not in Dr. Von Herzen's Corrected Invalidity Report from April 5, 2012. Dr. Von Herzen now seeks to rewrite his Invalidity Report to include these arguments raised in his later rebuttal non-infringement report.

132. As a preliminary matter, Dr. Von Herzen is construing the phrase "or near touches" to mean "and near touches." As noted above in my discussion of the Perski '455 patent, this construction is contrary to the plain meaning of the claim terms and not supported by the specification or prosecution history of the '607 Patent (and, I understand, is subject to an objection by Apple).

133. Similarly, as noted above in my discussion of the Perski '455 patent, Dr. Von Herzen now raises a new claim construction for invalidity purposes in paragraph 96 regarding the "wherein" clause of claim 1 (incorporated into claim 8 of the '607 Patent). As noted above, I believe Dr. Von Herzen's construction is contrary to the plain meaning of the claim and to the disclosure in the specification of the '607 Patent. Even if one were to accept that language of claim 1 (incorporated into claim 8) requires "driving more than one line at the same time while sensing more than one line" (Dkt. No. 942 ¶ 96), Figure 2 of Smartskin plainly depicts that the input transmitting signal is switched between the vertical transmitting electrodes. Thus, it is clear that only one vertical electrode receives a transmitted signal at a time. In the same way, it is clear that the analog to digital converter reads signals from the receivers one at a time. Consequently, the text in conjunction with Figure 2 clearly shows that the signal is *not* "transmitted to a subset of all of the electrodes in one axis while all the electrodes on the other axis are sensed." (Dkt. No. 942 ¶ 96.) Dr. Von Herzen is incorrect in his description of the Smartskin paper on this point.

VII. SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS.

134. I note that there are significant "secondary considerations" of non-obviousness with respect to the claimed invention including, among other things: (1) commercial success of the claimed invention; (2) praise or industry acclamation for the claimed invention, (3) initial expressions of disbelief or skepticism by experts in the field (4) copying, and (5) failure of others.

A. Commercial Success of Apple's Invention.

135. I have spoken to the named-inventors of the '607 Patent claims who were working on designs for Apple's products when they conceived of their invention and I have examined the various Apple iPhone products sold in the U.S. and the iPad and iPad 2 products sold in the U.S. and reviewed documents relating to their operation. Attached as Exhibit G hereto are true and

correct copies of APLNDCA0000153862-870; APLNDCA0001278440-48; APL-ITC796-0000402782-2834; APL-ITC796-0000403337-378; APL-ITC0000405165-5208; APL-ITC796-0000405693-5736; APL-ITC796-0000406250-278. I have concluded that Apple's products embody Claims 8 (including limitations of Claims 1 and 7 which are incorporated into Claim 8) of the '607 Patent.

136. The Preamble of Claim 1 states, "[a] touch panel comprising a transparent capacitive sensing medium configured to detect multiple touches or near touches that occur at a same time and at distinct locations in a plane of the touch panel and to produce distinct signals representative of a location of the touches on the plane of the touch panel for each of the multiple touches, wherein the transparent capacitive sensing medium comprises." I conclude that the Apple iPhones and the Apple iPad and iPad 2 products meet this limitation because they include a "touch panel" that includes "a transparent capacitive sensing medium" of mutual-capacitive drive and sense electrodes that are "configured to detect multiple touches or near touches that occur at a same time and at distinct locations in a plane of the touch panel," and "produce distinct signals representative of a location of the touches on the plane of the touch panel for each of the multiple touches." The text of the remainder of this claim describes first and second conductive lines running transversely and from which can be detected "charge coupling between" the lines. In conjunction with that claim language, the requirement of detecting "multiple touches or near touches that occur at a same time" and to produce distinct signals representative of a location of the touches on the plane of the touch panel," means that the claimed "touch panel" (and the Apple products embodying claimed "touch panel") can detect and locate multiple touches even when the touches are along a single sense line, and can smoothly track the motion of multiple fingers. As is evident from their smooth and accurate identification of multiple fingers in multiple-finger gestures, all of the Apple products I examined do this.

137. Claim 1 also requires, "a first layer having a plurality of transparent first conductive lines that are electrically isolated from one another." I conclude that the Apple iPhones and the iPad and iPad 2 products meet this limitation because they have "a first layer having a plurality of transparent first conductive lines that are electrically isolated from one

another." The first electrode layer contains lines that are made of a transparent conductive material (Indium Tin Oxide or "ITO") and are electrically isolated from each other via etch gaps.

138. Claim 1 also requires, "a second layer spatially separated from the first layer and having a plurality of transparent second conductive lines that are electrically isolated from one another, the second conductive lines being positioned transverse to the first conductive lines, the intersection of transverse lines being positioned at different locations in the plane of the touch panel, each of the second conductive lines being operatively coupled to capacitive monitoring circuitry." I conclude that the Apple iPhones and the iPad and iPad 2 products meet this limitation because they have "a second layer spatially separated from the first layer and having a plurality of transparent second conductive lines that are electrically isolated from one another, the second conductive lines being positioned transverse to the first conductive lines, the intersection of transverse lines being positioned at different locations in the plane of the touch panel, each of the second conductive lines being operatively coupled to capacitive monitoring circuitry." Each of the Apple products I examined included a second layer of ITO separated spatially from the first layer of ITO and the second layer are conductive lines that are electrically isolated from one another and positioned to run transversely to the first layer of ITO conductive lines and that are coupled to sensing circuitry to monitor capacitive coupling of, for example, a finger on the touch sensor. The required monitoring circuitry I discuss in the next claim limitation below.

139. Claim 1 also states, "wherein the capacitive monitoring circuitry is configured to detect changes in charge coupling between the first conductive lines and the second conductive lines." I conclude that the Apple iPhones and the iPad and iPad 2 products meet this limitation because "the capacitive monitoring circuitry is configured to detect changes in charge coupling between the first conductive lines and the second conductive lines." Indeed, all of the Apple iPhones and iPad and iPad 2 products I examined operate on the principle of mutual capacitance in which the sense circuits detect charge coupling between the sense and drive lines.

140. Claim 7 requires, "[t]he touch panel as recited in claim 1, wherein the capacitive sensing medium is a mutual capacitance sensing medium." I conclude that the Apple iPhones and the iPad and iPad 2 products meet this limitation because "the capacitive sensing medium" in each "is a mutual capacitance sensing medium." All of the Apple products I examined use mutual capacitance as the sensing method.

141. Claim 8 requires, "[t]he touch panel as recited in claim 7, further comprising a virtual ground charge amplifier coupled to the touch panel for detecting the touches on the touch panel." I conclude that the Apple iPhones and the iPad and iPad 2 products meet this limitation because "touch panel" in each "includes a virtual ground charge amplifier coupled to the touch panel for detecting the touches on the touch panel." I have confirmed this by examining the circuits in the Apple products.

142. I understand that Terry L. Musika has testified that the claimed inventions of the '607 Patent, including the limitations of Claim 8, were commercially successful.

143. As noted previously in my March 22, 2012 Report, I do not believe that Samsung had available to it at the time it began its infringing activity any workable solution for competitive products in the marketplace that did not include the claimed inventions of the '607 Patent.

B. Industry Praise and Disbelief in the Industry Concerning Apple's Invention.

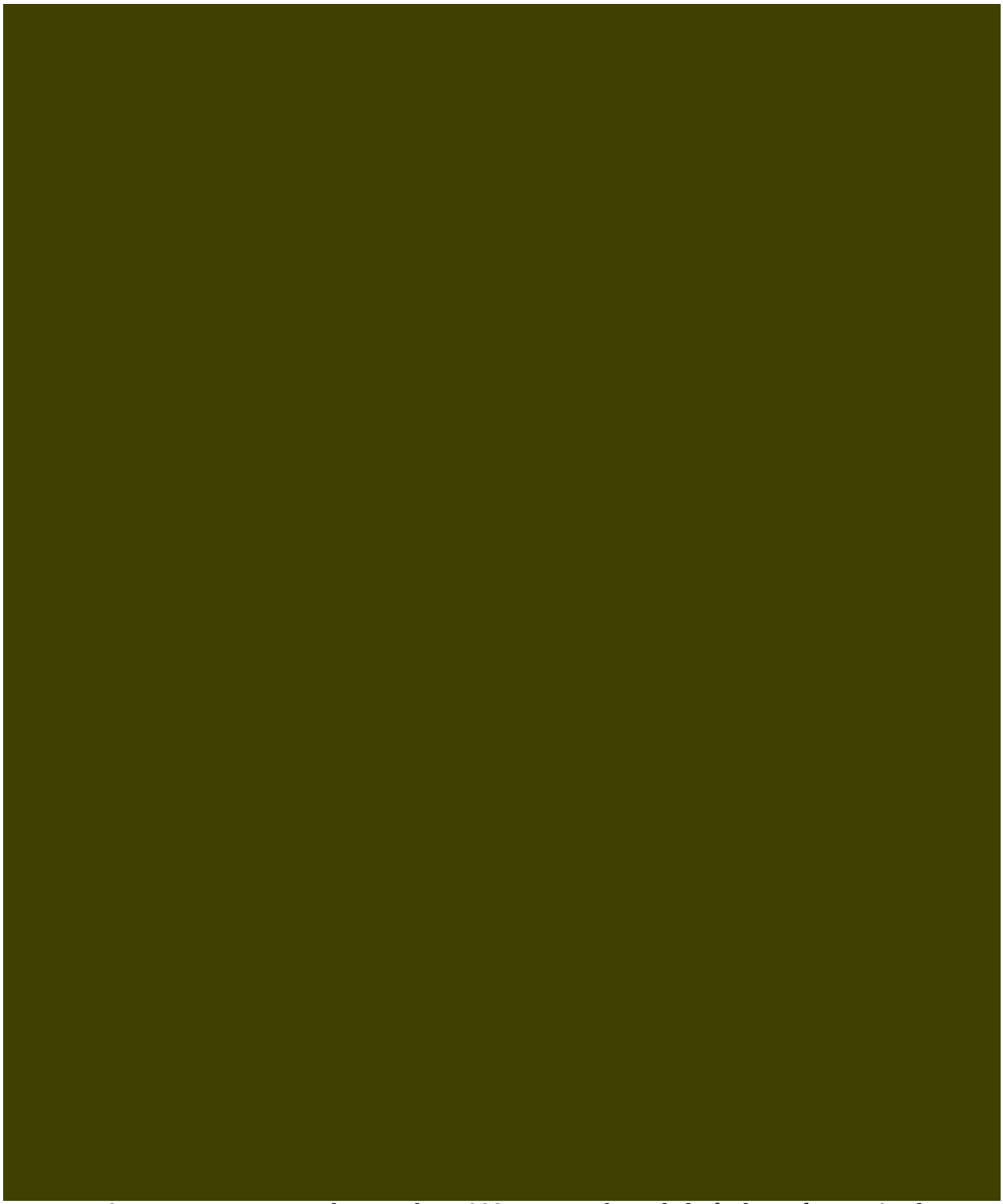
144. I also believe that there has been undisputed praise or industry acclamation for Apple's touch sensor devices, particularly the implementation of accurate and reliable identification and tracking of multiple finger touch events on the surface of the Apple iPhone, iPod Touch, and iPad products.[1] Those aspects of the Apple products would not have been practically achievable without the invention of the '607 Patent.

[1] Graham Smith, "Apple iPad named Gadget Of The Year at Prestigious T3 Awards," http://www.dailymail.co.uk/sciencetech/article-1319777/Apple-iPad-named-Gadget-Of-The-Year-prestigious-T3-Awards html; IDSA, "2008 IDEA Best in Show," http://www.idsa.org/content/content1/apple-iphone ; Lev Grossman, "Invention of the Year: The iPhone," Time, Nov. 1, 2007, http://www.time.com/time/specials/2007/article/0,28804,1677329_1678542_1677891,00 html; Engadget, "Ten Gadgets that Defined the Decade," Dec. 30, 2009, http://www.engadget.com/2009/12/30/ten- gadgets-that-defined-the-decade/; and Tom Krazit, "Apple's iPhone Wins Second J.D. Power Award," April 30, 2009, http://news.cnet.com/8301-13579_3-10231135-37 html.

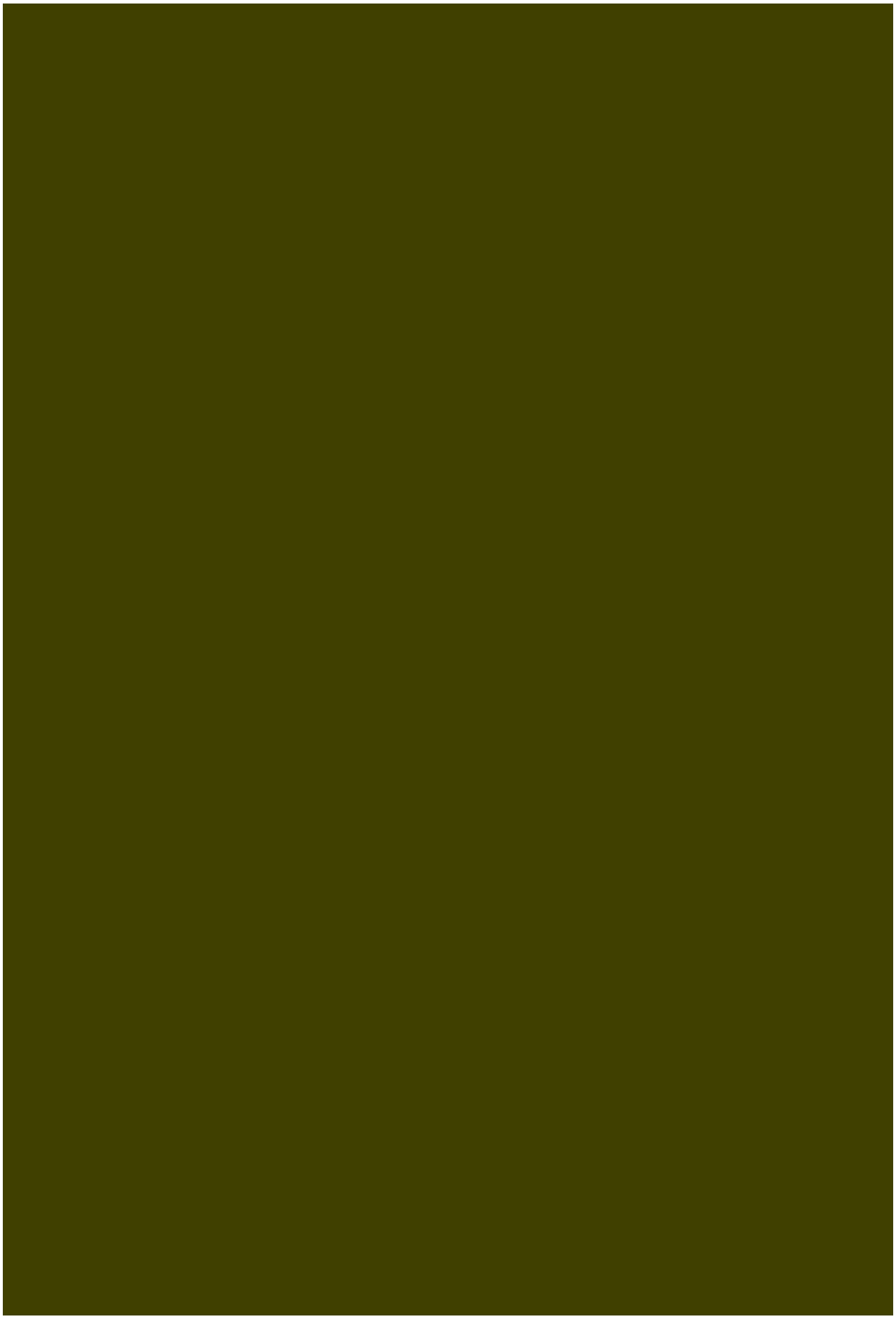
145. I also believe that there was significant disbelief in the industry that a true multitouch implementation of a sleek transparent touch screen as could be implemented in a hand-held device was achievable. That fact is underscored by the many efforts to create such touch screen exemplified by the references that Dr. Von Herzen has cited in his Declaration. It is clear that many hundreds if not thousands of engineers had been working on this problem for perhaps 20 years before the engineers at Apple solved it. Those many years of effort all led to complete failure by others to find the precise solutions that Apple's engineers invented. It is evident that prior to Apple's introduction of the fundamental technology found in the Apple iPhone, iPod Touch, and iPad products, no other company in the world had achieved that success.

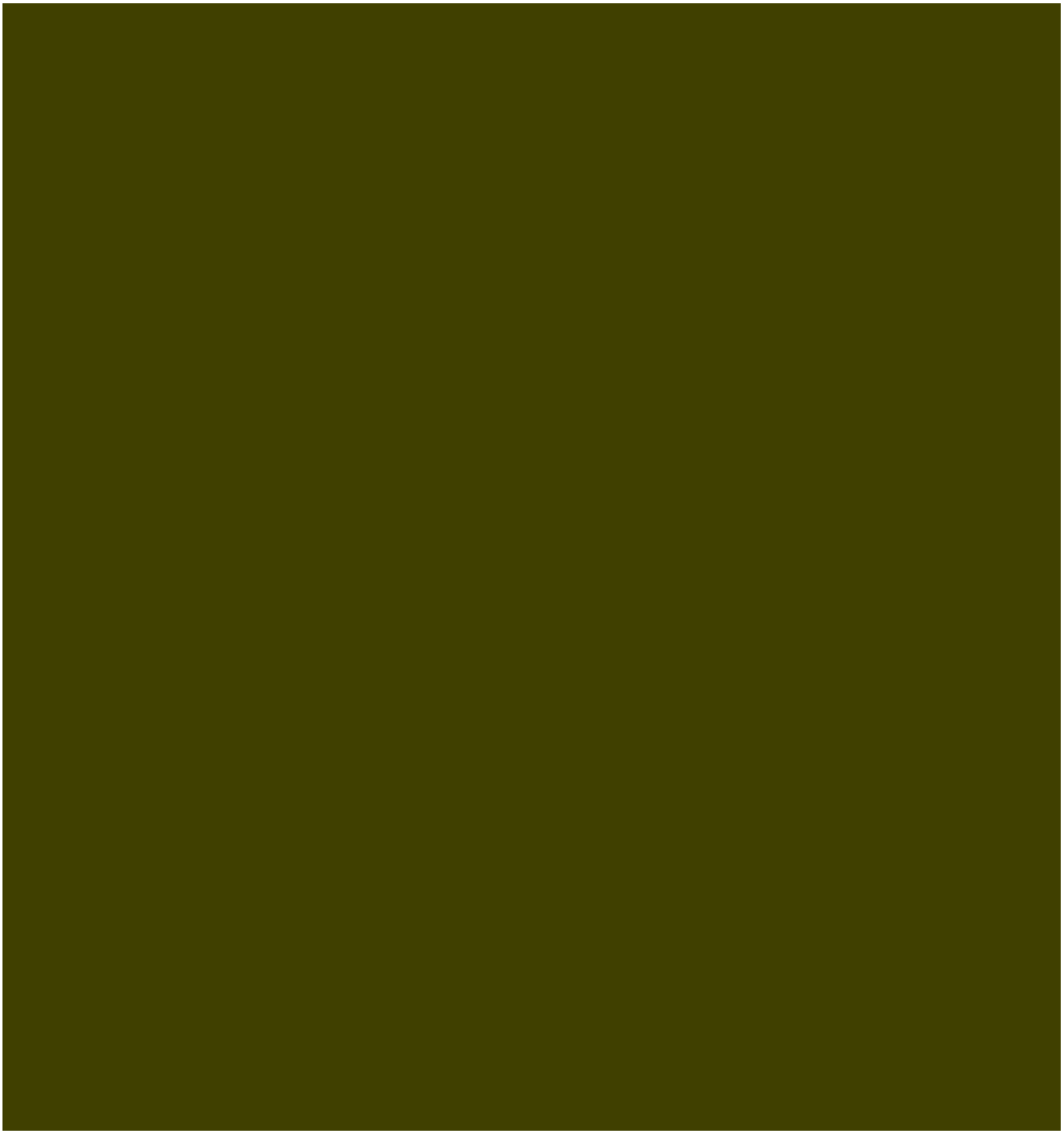
[redacted]

147. The overwhelming success of the Apple iPhone subsequent to its entry into the market in 2007 profoundly changed customer expectations of the features and interfaces expected in smartphones and, by extension, forced many technology manufacturers to adjust their strategic plans and tech development [redacted]



150. Beginning around December 2008, rumors abounded of a large format Apple offering with a touchscreen (*i.e.* a tablet computer) similar to an iPhone, but larger. These rumors persisted and grew through early 2009. http://techcrunch.com/tag/ipad/page/57/, http://techcrunch.com/tag/ipad/page/56/, http://techcrunch.com/tag/ipad/page/55/, http://techcrunch.com/tag/ipad/page/54/, (accessed March, 13 2012).





158. The evidence above speaks powerfully to the nonobviousness of the inventions of the ’607 Patent. In short, if the inventions of these patents were as obvious and trivial as Dr. Von Herzen claims, why did no one in the world, despite the efforts of thousands of engineers and decades of work, arrive on the precise solutions set forth in the ’607 Patents, and why would Samsung, a vast global engineering company with billions of dollars of resources, decide to drop all of its prior designs and copy Apple’s designs? I conclude that the answer to those questions is that the Apple inventions were not trivial or obvious.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct and that this Declaration was executed this 30th day of May, 2012, at Berkeley, California.

Dated: May 30, 2012

/s/ *Michel Maharbiz*
Michel Maharbiz