

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., and
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioners,

v.

RESONANT SYSTEMS, INC.,
Patent Owner.

Case No. IPR2023-00992
U.S. Patent No. 9,369,081

Case No. IPR2023-00993
U.S. Patent No. 9,941,830

EXPERT DECLARATION OF KEITH W. GOOSSEN, PH.D.

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I. BACKGROUND

1. I have been retained as a technical expert by Patent Owner Resonant Systems, Inc. (“Patent Owner” or “Resonant Systems”) in this proceeding. Resonant Systems has asked me to provide my expert opinions concerning certain technical aspects of vibration modules and associated technologies as they relate to the petitions filed by Petitioners Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively “Petitioners” or “Samsung”) for inter partes review of U.S. Patent 9,369,081 (“’081 patent”) in Case No. IPR2023-00992 (“’081 IPR”) and of U.S. Patent 9,941,830 (“’830 patent”) in Case No. IPR2023-00993 (“’830 IPR”) and the accompanying Declarations of Andrew Wolfe.

2. The ’081 and ’830 patents share a common specification, and the claims contain similar, though not identical, limitations. The invalidity grounds presented in the ’081 IPR and the ’830 IPR rely on the same prior art in the same combinations. The petitions and Wolfe declarations in the two IPRs have a very high degree of overlap, both in terms of the precise text and of the substance. As a result, my opinions in response to both IPRs and both Wolfe declarations are in large part the same. For convenience I therefore submit one declaration addressing both of the IPRs. Unless I expressly state otherwise,

any opinions that I offer concerning issues in one of the IPRs also applies to the corresponding issues in the other IPR.

3. The statements in this declaration summarize my opinions on these matters based on my over 35 years of experience in electrical engineering, electro-mechanical systems, and sensors, my education, knowledge, skills, and my review and analysis of the materials referenced herein.

4. I am being compensated for my work in this matter at the rate of \$350 per hour. I am also being reimbursed for reasonable and customary expenses associated with my work and testimony in this investigation. My compensation is not contingent on the outcome of this matter or the substance of my testimony.

II. MATERIALS CONSIDERED

5. In the preparation of this declaration and the opinions contained herein, I have considered the petitions and other materials, as listed below:

- The patents 9,369,081 and 9,941,830 (Ex. 1001 in each IPR)
- The petitions and accompanying exhibits in IPR2023-00992 and IPR2023-00993, including prior art references and the declarations of Dr. Andrew Wolfe
- The deposition transcript of Dr. Wolfe

- The claim construction positions taken by the parties in *Resonant Systems, Inc. v. Samsung Electronics Co., Ltd.*, Case No. 2:22-cv-00423 (E.D. Texas)
- Additional exhibits Ex. 2013 and Ex. 2014 pertaining to how a POSITA would have understood teachings of the prior art

III. SUMMARY OF OPINIONS

6. As set forth in further detail below, I agree with certain of the claim constructions proposed by Samsung and disagree with others.

7. As set forth in detail below, I disagree that Samsung has successfully shown that any of the challenged patent claims of the '081 and '830 patents is obvious, either because Samsung has failed to establish that the proposed combination or modification would satisfy the claims under their proper constructions, or because Samsung has failed the properly demonstrate a motivation to make the combination or modification in question.

IV. EDUCATIONAL AND EMPLOYMENT BACKGROUND

8. Attached as Exhibit 2009 is my CV. I summarize in this section my educational background, career history, publications, and other relevant qualifications. My qualifications can be found in my curriculum vitae, including details about my employment history, fields of expertise, and publications.

9. I became an Associate Professor in Electrical and Computer Engineering at the University of Delaware in 2002 and in 2018 was promoted to Professor. I oversee the Optoelectronic Packaging and Integration laboratory at the University of Delaware. I am also the Director of the Mid-Atlantic Industrial Assessment Center, an award-winning center for research and development of energy systems and energy efficiency. The Center has won the 2012 U.S. Department of Energy Best Center award, and the 2015 U.S. Department of Energy Excellence in Applied Energy Engineering Research award.
10. I have served on professional committees including the IEEE Conference on Micro Electro Mechanical Systems and IEEE Optical Interconnect conferences. I am a Senior Member of the Institute of Electrical and Electronic Engineers (IEEE).
11. I earned a B.S. in Electrical Engineering from the University of California at Santa Barbara (1983) and an M.A. in Electrical Engineering from Princeton University (1985). I received my Ph.D. from Princeton University in 1988, and worked at Bell Labs from 1988 until founding Aralight, Inc. in September, 2000. I performed research at Bell Labs in MEMS-based (Micro-Electro-Mechanical Systems-based) optical switches, much of which forms the basis of today's wavelength selective switches.

12. In September of 2000, I co-founded Aralight, Inc, where I was involved in the company's raising of \$10 million in capital and the growth of the company to 35 people. The company's product, an integrated optoelectronic fiber-optic transmit/receive module—showing 3x the bandwidth of previous such products—was based upon my inventions and followed on my research at Bell Labs. Aralight was later sold and its product forms the basis of today's Active Optical Cabling, which enables high-speed optical backplanes for switches and supercomputers.

13. I am the inventor (or co-inventor) on 87 issued U.S. patents. I have over 300 published papers and conference proceedings.

14. My qualifications include teaching electromagnetics and electric power systems, which address the same physics of haptic devices in that they involve converting electrical energy to mechanical energy. In electric power systems and haptic devices, currents and/or voltages are used to produce electric or magnetic forces on masses in order to cause their rotary or linear motion. For electric motors, vibration is considered a loss mechanism and not optimized. In haptics, essentially, the vibration loss mechanism is what is desired to be optimized.

15. A specific qualification is my invention of the Mechanical Anti-Reflection Switch, or MARS device. This is a Micro-Electromechanical System, or

MEMS device, designed to produce digital movement in response to a data input. It was instrumental in early testing of various fiber optic systems, and to this date I believe holds the record for the fastest controlled mechanical device ever produced at 10 Mbits/second.

V. LEVEL OF ORDINARY SKILL IN THE ART

16. It is my opinion that a POSITA at the time of the invention would have had (1) a bachelor's degree in electrical engineering, mechanical engineering, or a comparable field of study, and (2) at least two years of professional experience with electro-mechanical control systems, or other similarly relevant industry experience. Additional relevant industry experience may compensate for lack of formal education or vice versa. I qualified as a POSITA as of the earliest claimed priority date of the '081 and '830 patents, in May 2009. I also understand the capabilities of a POSITA at the relevant time because I was working with and providing technical direction to others with similar levels of training and experience during that period.

17. I note that Petitioners offer a similar level of ordinary skill in the art, with the exception that they specify experience "related to electronic consumer product design," while my definition specifies experience with "electro-mechanical control systems" or similarly relevant experience.¹ Petitioners

¹ IPR2023-00992 Petition at 6; IPR2023-00993 Petition at 6.

do note that a POSITA could have obtained “similar knowledge and experience through other means.”² Based upon my experience as a Ph.D. electrical engineer, industry researcher, company co-founder, and university teacher and researcher, I also qualified as a POSITA and understand the capabilities of a POSITA under Petitioner’s definition of the level of ordinary skill in the art. My opinions herein would not change if the Board were to adopt Petitioners’ definition for the level of ordinary skill.

18. In this declaration, I offer opinions from the perspective of a POSITA having ordinary skill in May 2009. I note that Petitioners argue that certain claims have later priority date than May 2009. In particular, Petitioners argue that claims 14 and 16 of the ’081 patent and claims 14, 16, and 19 of the ’830 patent have a priority date no earlier than January 6, 2012.³ My opinions in this declaration would not change if offered from the perspective of a POSITA having ordinary skill in January 2012.

VI. RELEVANT LEGAL STANDARDS

19. I have been informed of the legal standards for establishing patent invalidity in inter partes review proceedings before the Patent Trial and Appeal Board.

² IPR2023-00992 Petition at 6; IPR2023-00993 Petition at 6.

³ IPR2023-00992 Petition at 67, 72; IPR2023-00993 Petition at 67, 72.

20. I understand that the petitioner must prove invalidity of a patent claim by a preponderance of the evidence, that is, the evidence must be sufficient to show that a fact or legal conclusion is more likely than not.

21. I understand that a claim may be anticipated if (1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention; or (2) the claimed invention was described in a patent or published application, in which the patent or application names another inventor and was effectively filed before the effective filing date of the claimed invention.

22. I understand that, once the claims of a patent have been properly construed, the next step in determining anticipation of a patent claim requires a comparison of the properly construed claim language to the prior art on a limitation-by-limitation basis.

23. I understand that even if a patent claim is not anticipated, it may still be invalid if the differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person of ordinary skill in the pertinent art.

24. I also understand that a patent may be rendered obvious based on an alleged prior art reference or a combination of such references plus what a person of ordinary skill in the art would understand based on his or her

knowledge and the references. It is also my understanding that in assessing the obviousness of claimed subject matter one should evaluate obviousness over the prior art from the perspective of one of ordinary skill in the art at the time the invention was made (and not from the perspective of either a layman or a genius in that art).

25. I understand that a patent claim composed of several elements is not proved obvious merely by demonstrating that each of its elements was known in the prior art. There must be a reason for combining the elements in the manner claimed. That is, there must be a showing that a person of ordinary skill in the art at the time of the invention would have thought of either combining two or more references or modifying a reference to achieve the claimed invention.

26. I understand that an obviousness determination includes the consideration of the following factors: (1) the scope and content of the prior art, (2) the differences between the prior art and the claims at issue, (3) the level of ordinary skill in the art, and (4) objective evidence of nonobviousness.

27. I understand that the burden is on the petitioner to explain how specific references could be combined, which combinations of elements in specific references would yield a predictable result, and how any specific combination would operate or read on the claims. I further understand that the petitioner

cannot rely on conclusory statements but must instead provide a reasoned explanation supported by evidence. I also understand that obviousness does not exist where the prior art discourages or teaches away from the claimed invention. I also understand that even if a reference does not teach away, its statements regarding preferences are relevant to a finding whether a person skilled in the art would be motivated to combine that reference with another reference.

28. I understand that it is impermissible to use hindsight to arrive at the claimed invention. My understanding is that the inventor's own path never leads to a conclusion of obviousness. I also understand that, when assessing whether there was a motivation to combine references to teach a claim element, defining the problem in terms of its solution reveals improper hindsight.

29. I understand that a proper determination of the validity of patent claims can only be done after the claims have been properly construed. I understand that a claim construction inquiry begins and ends with the actual words of the claim. Apart from the written description and the prosecution history, the claims themselves provide substantial guidance as to the meaning of particular terms. I further understand that the context in which a term is used in the asserted claim can be highly instructive. The patent specification can also shed light on the meaning of claim terms.

30. I understand that, when conducting a claim construction inquiry, courts are not required to construe every limitation present in a patent's asserted claims. I further understand that where a term is used in accordance with its plain meaning, the court should not re-characterize it using different language.

31. I understand that there is a "heavy presumption" that claim terms carry their full ordinary and customary meaning unless the accused infringer can show that the patentee expressly relinquished claim scope. The ordinary and customary meaning of a claim term is the meaning that the term would have to a POSITA at the time of the invention.

32. I understand that courts generally do not import limitations into claims from examples or embodiments appearing only in a patent's written description, even when a specification describes very specific embodiments of the invention or even only a single embodiment. Similarly, I understand that statements during patent prosecution do not limit the claims unless the statement is a clear and unambiguous disavowal of claim scope.

33. I understand that, under 35 U.S.C. § 112 ¶ 6, "[a]n element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof."

35 U.S.C. § 112 ¶ 6. I understand that the standard for determining whether § 112 ¶ 6 applies is whether the words of the claim are understood by persons of ordinary skill in the art to have a sufficiently definite meaning as the name for structure. Where a claim term lacks the word “means,” there is a presumption that § 112 ¶ 6 does not apply. To rebut this presumption, the challenger must demonstrate that the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function. I understand this presumption cannot be overcome without showing that the claim limitation is devoid of anything that can be construed as a structure. I further understand that if § 112 ¶ 6 does apply, then the corresponding structure should not be limited to the structure described for a single embodiment in the specification if the patentee has disclosed multiple embodiments.

34. I understand that when a claim is subject to § 112 ¶ 6 and it recites basic processor functions, the specification need not disclose corresponding algorithms because a standard microprocessor can provide sufficient structure for functions that can be achieved by any general purpose computer without special programming. If special programming is required to perform the claimed function, I understand that a corresponding algorithm can be expressed in the patent in any understandable terms, including as a mathematical formula, in

prose, as a flow chart, or in any other manner that provides sufficient structure.

I further understand that, if a corresponding algorithm is required, steps that are not necessary to perform the claimed function must be omitted from the algorithm because the algorithm must only include what is necessary and nothing more.

35. I understand that a typographical error in a patent claim can be corrected by the Board during claim construction, as long as the correction is not subject to reasonable debate based on the claim language and specification, and as long as the prosecution history does not suggest a different interpretation of the claim.

VII. BACKGROUND OF THE '081 AND '830 PATENTS

36. The '081 and '830 patents generally relate to haptic devices, which can be roughly described as electro-mechanical devices that vibrate in response to an input (such as touching a touch screen). Such devices are commonplace today as a human interface feedback, for example informing the human that they have correctly made an input. A haptic device can be generalized as having an electrical driving force, either an electric or magnetic field, causing a weight or mass to move, usually in an oscillatory fashion. The movement of the mass can roughly be generalized as rotary or linear. The movement of the mass is connected either mechanically or electro-mechanically to a housing,

which is connected in some way to whatever surface the human touches, and thus the vibration caused by the oscillatory movement is transmitted to the human.

37. While a more technological table of haptic devices is given below, a high level overview of electromechanical devices in general is:

force \ movement	rotary	linear
magnetic	electric motor	loudspeaker
electric	rotary actuators	piezoelectric

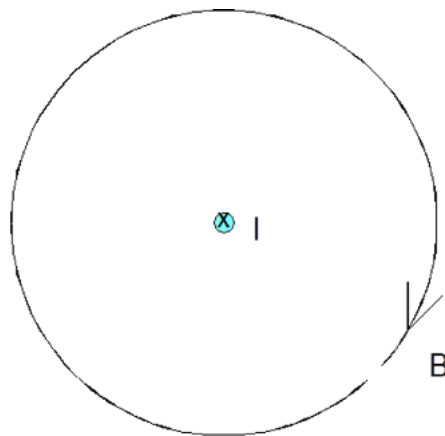
38. One can see that both electric and magnetic fields can produce both rotary and linear movement, although, magnetic devices can be generally larger and produce more mechanical power, which is inherent in that electric field requires shorter distances to generate large forces.

39. Before going forward it is useful to connect the use of the terms, electric and magnetic fields, to the driving voltages and currents, and the resulting forces. Electric actuation is easy to understand, as a voltage across two plates produces an electric field in the same direction as the voltage (perpendicular

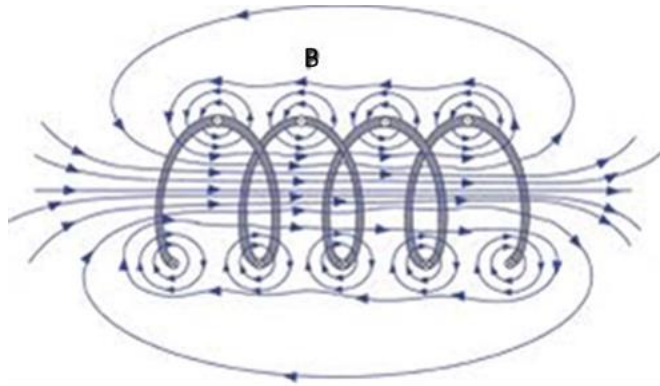
to the plates), and a charged object between the plates will experience a force in the same direction as the electric field.

40. Magnetic actuation is a bit more difficult as the vectors of the fields and both the driving currents (alternating voltages can be used to produce magnetic fields, but it is less common), and the magnetic forces, are at right angles to the magnetic fields.

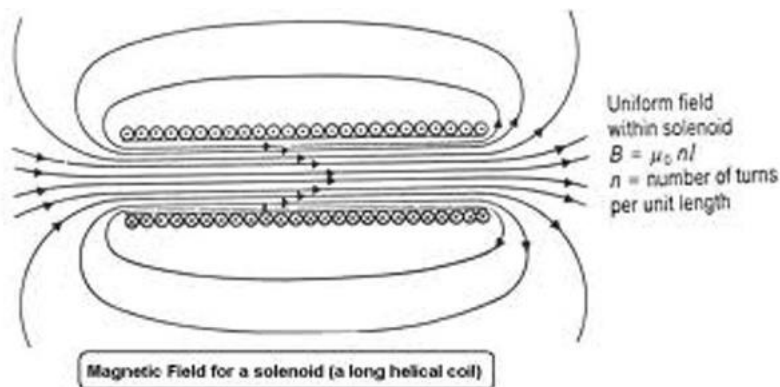
41. For example, by Ampere's Law, a current-carrying wire will produce a circular magnetic field with its axis being the wire:



42. Here the current-carrying wire is perpendicular to the page and the current is directed into the page. If a current-carrying coil is formed, the direction of the magnetic field can be determined by adding up the contributions of all the wires in the coil:

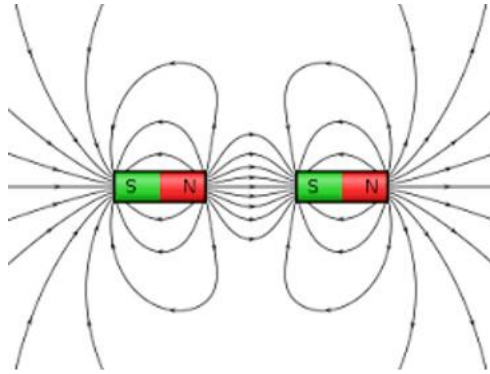


43. One sees that by considering that the effect of every point on the wire in the coil, causing a circular magnetic field around it, and adding those effects, the resulting overall magnetic field can be determined. As can be seen, as the coil is more tightly wound (sometimes then called a solenoid), the magnetic field becomes concentrated within the coil, in a direction along the axis of the coil:



44. Now we get to the forces resulting from the magnetic field. If the object in the magnetic field is itself a magnet, this is easy, the force is in the same direction as the magnetic field. The way to understand this is that a magnet is essentially itself a “coil,” containing electrons rotating in the same circular

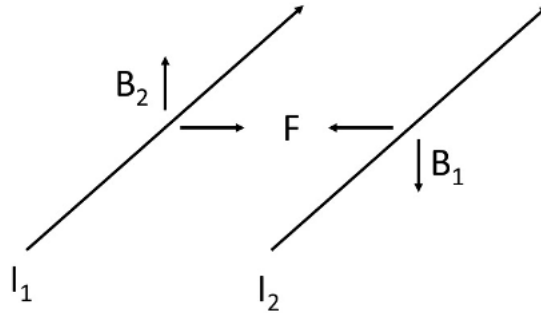
direction, resulting in a magnetic field. And, we all know that opposite poles attract:



45. One sees that the two magnets behave essentially like two solenoids producing magnetic fields in the same directions along their axes. Thus, in the above drawing, you could replace one of the magnets with the solenoid of the previous drawing, and have the same attractive forces occurring.

46. The basis of the forces between two magnets, or between a magnet and a solenoid, or between two solenoids for that matter, must be found by considering the forces on the currents embedded in each, which are circular about their axes. A magnetic field only produces a force on a moving charge, or current, and that force is at right angles to both the magnetic field and the current. In the above drawing of the two magnets, the force on the left magnet is to the right. The “currents” in the left magnet are like that in the solenoid earlier pictured. The force is at right angles to both. To understand the overall

force one must consider the entire coil, and that's hard. A simple principle that helps us understand the overall effect is that like currents attract:



47. Thus, the two attracting “solenoids” in the magnet drawing have all their “currents” in the same direction, and thus they all attract. For the same reason two magnets with their poles in the same direction will attract.

48. Now that the basic electro-physics has been explained, the forced movement of any magnet or charge due to any current or voltage can be determined.

49. As mentioned, haptic devices come in a variety of forced motions and electrical forces. This table summarizes the various types (from “Development of a Human-Display Interface with Vibrotactile Feedback for Real-World Assistive Applications,” in Sensors, 2021):

Table 1

Comparison of actuators and needed characteristics for haptic feedback.

Characteristics	Actuators	Voice Coil Motor	Eccentric Rotating Mass Motor	Linear Resonant Actuator	Piezoelectric Actuator	Electrostatic Tactile Actuator
Response time		High	Low	High	High	High
Bandwidth		High	Low	Low	High	High
Displacement output		High	High	Medium	Medium	Low
Power consumption		Low	Low	Low	High	High
Mechanical simplicity		Medium	Low	High	Medium	Medium

50. The main types of haptic generators in human interfaces such as touch screens, such as on smartphones, are Eccentric Rotating Mass Motor (ERMM) and Linear Resonant Actuator (LRA) devices. ERMMs are basically unbalanced motors that when rotating thus produce a vibration. LRAs are the subject of these IPRs and are devices that cause reciprocating linear motion of some mass, resulting in vibration. One sees that the LRA is superior in various respects to the ERMM, and thus have largely taken over as the technology of choice in haptic generators. The inventors of the '081 and '830 patents understood these advantages, which led them to the claimed inventions, as reflected in the exemplary description below from the '830 patent (2:15-3:25):

While effective in producing vibrations, there are many problems associated with the unbalanced-electric-motor vibration-generating units, such as that shown in FIG. 1A, commonly used in the various devices, systems, and applications discussed above. First, unbalancing the shaft of an electric motor not only produces useful vibrations that can be harnessed for various applications, but also produces destructive, unbalanced forces within the motor that contribute to rapid deterioration of motor parts. Enormous care and effort is undertaken to precisely balance rotating parts of motors, vehicles, and other types of machinery, and the consequences of unbalanced rotating parts are well known to anyone familiar with automobiles, machine tools, and other such devices and systems. The useful lifetimes of many devices and appliances, particularly hand-held devices and appliances, that employ unbalanced electric motors for generating vibrations may range from a few tens of hours to a few thousands of hours of use, after which the vibrational amplitude produced by the devices declines precipitously as the electric motor and other parts deteriorate.

A second problem with unbalanced electric motors is that they are relatively inefficient at producing vibrational motion. A far greater amount of power is consumed by an unbalanced electrical motor to produce a given vibrational force than the theoretical minimum power required to produce the given vibrational force. As a result, many hand-held devices that employ unbalanced

electric motors for generating vibrations quickly consume batteries during use.

A third problem with unbalanced electric motors, discussed above, is that they generally produce elliptical vibrational modes. Although such modes may be useful in particular applications, many applications can better use a linear oscillation, with greater directional concentration of vibrational forces. Linear oscillation cannot generally be produced by unbalanced electric motors.

A fourth, and perhaps most fundamental, problem associated with using unbalanced electric motors to generate vibrations is that only a very limited portion of the total vibrational-force/frequency space is accessible to unbalanced electric motors. FIG. 3 shows a graph of vibrational force with respect to frequency for various types of unbalanced electric motors. The graph is shown as a continuous hypothetical curve, although, of course, actual data would be discrete. As shown in FIG. 3, for relatively low-power electric motors used in hand-held appliances, only a fairly narrow range of frequencies centered about 80 Hz (302 in FIG. 3) generate a significant vibrational force. Moreover, the vibrational force is relatively modest. The bulk of energy consumed by an unbalanced electric motor is used to spin the shaft and unbalanced weight and to overcome frictional and inertial forces within the motor. Only a relatively small portion of the consumed energy is translated into desired vibrational forces.

Because of the above-discussed disadvantages with the commonly employed unbalanced-electric-motor vibration-generation units, designers, manufacturers, and, ultimately, users of a wide variety of different vibration-based devices, appliances, and systems continue to seek more efficient and capable vibration-generating units for incorporation into many consumer appliances, devices, and systems.

SUMMARY

The current application is directed to various types of linear vibrational modules, including linear-resonant vibration modules, that can be incorporated in a wide variety of appliances, devices, and systems to provide vibrational forces. The vibrational forces are produced by linear oscillation of a weight or member, in turn produced by rapidly alternating the polarity of one or more driving electromagnets. Feedback control is used to maintain the vibrational frequency of linear-resonant vibration module at or near the resonant frequency for the linear-resonant vibration module. Both linear vibration modules and linear-resonant vibration modules can be designed to produce vibrational amplitude/frequency combinations throughout a large region of amplitude/frequency space.

51. Thus in an LRA (referred to in certain asserted patents as a “LRVM,” or Linear Resonance Vibration Module), a mass is moved in a linear reciprocating

cating fashion within a housing, with the main embodiment being by wrapping the housing with a solenoid like coil, that produces a magnetic field within the housing, like described above. This magnetic field produces a force on a magnet in the housing, and when the coil is driven with an alternating current, the magnet first is force one way than the other, and thus oscillates, producing a vibration.

52. Further background on the claimed inventions is provided in the specification of each patent, especially the portions referenced in my analyses below.

VIII. CLAIM CONSTRUCTION

53. Petitioners argue that three terms “moveable component,” “driving component,” and “control component” should each be construed as means-plus-function terms under 35 U.S.C. § 112 ¶ 6.⁴ They propose the same construction for each term in the ’081 and ’830 patents, but for “control component,” they argue for a different structure in claims 3 and 4 of each patent than in the other claims where the term appears.⁵ Petitioners also propose two alternate interpretations of claim 4 of each patent.⁶

⁴ IPR2023-00992 Petition at 6–8; IPR2023-00993 Petition at 7–8.

⁵ IPR2023-00992 Petition at 6–8; IPR2023-00993 Petition at 7–8.

⁶ IPR2023-00992 Petition at 8; IPR2023-00993 Petition at 9.

54. I address Petitioners’ proposed claim constructions for each of these terms below. For all other terms in the claims, I have applied the ordinary and customary meaning of the terms.

A. “movable component”

55. I understand that 35 U.S.C. § 112 ¶ 6 applies to elements expressed a means “for performing a specified function without the recital of structure, material, or acts in support thereof.” I do not understand the phrase “movable component” to be describing a function that the component performs or that would require the component to have any specific structure. In the context of the claims, the “movable component” simply has to be something that another element of the claims, the “driving component,” can cause to move in the manner claimed.⁷

56. Petitioners’ proposed function and corresponding structure (“moving weight”) do not meaningfully differ from the plain meaning of the term, as any material component will have weight, at least in so far as it is subject to a gravitational field. I see no issues in the obviousness grounds presented in these IPRs where the construction of “moveable component,” whether as a “moving weight” or with its plain and ordinary meaning, would make a difference to the outcome.

⁷ ’081 patent at 15:62–63; ’830 patent at 15:41–43.

57. However, to the extent that the Board does construe this term, I would note the submissions that Patent Owner and Petitioners have made concerning claim construction in the pending district court litigation between them. On February 1, 2024, the Patent Owner and Petitioners submitted a joint claim construction chart. Exs. 2011, 2012. While Patent Owner disputes that the term is subject to 35 U.S.C. § 112 ¶ 6, the parties do agree on what the function and corresponding structure should be, if the court finds the term is subject to § 112 ¶ 6. Ex. 2012 at 25. Specifically, the parties agree that the function is “moving” and that the disclosed structures are: “A moving weight. E.g., ’081 and ’830 Patents, Figs. 4A-4G (weight 404), Fig. 6 (oscillating mass 634), Fig. 11 (moving mass 1102), Fig. 12 (moving mass with additional coils 1202 and 1204), Fig. 13 (moving mass/weight 1306), Fig. 14 (driving magnet 1406), Figs. 15, 16 (magnets 1506, 1508).” Ex. 2012 at 25.

58. I agree that each of these examples in the agreed list of structures from the district court joint claim construction chart is a structure that performs the function of the claimed “movable component.” To the extent that this term is construed in this IPR, and it is found to be subject to 35 U.S.C. § 112 ¶ 6, it is my opinion that the correct function and structure are those agreed by the parties in the district court joint chart.

B. “driving component”

59. In my opinion, the “driving component” limitation in the ’081 and ’830 patent claims specifies a function without reciting structure sufficient for performing that structure. For example, it does not recite elements that a POSITA would recognize as a structure for performing the recited functions, such as an electromagnet. For that reason, I agree with Petitioners that it is a means-plus-function term subject to 35 U.S.C. § 112 ¶ 6.

60. In the district court joint claim construction chart, the parties agree that this term is subject to § 112 ¶ 6, and they agree on a list of example corresponding structures from the patents: “E.g., ’081 and ’830 Patents, Figs. 4A-4G (coil 420), Fig. 5A (coil 514), Fig. 6 (coil 626), electromagnet of Fig. 10, electromagnet of Fig. 11, Fig. 12 (coil 1206), Fig. 13 (first coil 1302 and second coil 1304), Fig. 14 (coils 1412 and 1414), Figs. 15, 16 (coil 1510), stator coils of Figures 24A, 24B, and 25.” Ex. 2012 at 31. I agree that each of these examples in the agreed list of structures from the district court joint claim construction chart is a structure that performs the function of the claimed “driving component.”

61. The parties disagree on how to characterize the structures, with Patent Owner preferring “one or more coils or electromagnets” and Petitioner preferring “one or more electromagnetic coils.” Ex. 2012 at 31. In my opinion

Patent Owner’s characterization is the more accurate, because it matches the language actually used in the specification to describe the example structures. However, I do not see the difference as one that needs to be resolved by the Board, as I see no issues in the obviousness grounds presented in these IPRs where resolving this dispute would make a difference to the outcome. To the extent that this term is construed in this IPR, however, it is my opinion that the corresponding structures should include at least those in the list of examples that are agreed by the parties in the district court joint chart.

C. “control component”

62. In my opinion, the “control component” limitations in the ’081 and ’830 patent claims each specify a function without reciting structure sufficient for performing that function. For example, these limitations do not recite elements that a POSITA would recognize as a structure for performing the recited functions, such as a microprocessor. For that reason, I agree with Petitioners that these are means-plus-function terms subject to 35 U.S.C. § 112 ¶ 6.

1. Claim 1

63. In the district court joint claim construction chart, the parties agree that the “control component” term of claim 1 is subject to § 112 ¶ 6, they agree on

the claimed function, and they partially agree on the corresponding structures from the patent, as summarized below:⁸

Patent Owner's Proposed Structure in District Court	Petitioners' Proposed Structure in District Court	Petitioner's Proposed Structure in Petitions
oscillator circuit; microcontroller with internal or external memory; processor; CPU; microprocessor; and equivalents thereof [if an algorithm is required] <i>Where the corresponding structure is a processor, CPU, or microprocessor, the processor/CPU/microprocessor is programmed with an algorithm</i> comprising the following steps: (a) <i>set the mode and strength to [default values or] values representing selections made by user input to the user input features</i>; and (b) <i>provide a corresponding output to the power supply</i> so that the power supply provides a corresponding output to the driving component See, e.g., '081 Patent at 7:10- 24, 8:10-20, Figs. 7A, 7C; '830 Patent at 7:20-34, 8:20-30, Figs. 7A, 7C.	Processor programmed with an algorithm to perform the following steps: (1) <i>set the mode and strength to [default values or] values represented by selections made by user input to the user input features</i>, (2) <i>provide a corresponding output to the power supply</i>, and (3) provide a corresponding output to the driving component. '081 Patent at 6:32-35, 7:10-24, 8:10-20, Figs. 7A, 7C; '830 Patent at 6:40-44, 7:20-34, 8:20- 30, Figs. 7A, 7C.	Processor and H Bridge Switch, where processor is programmed with an algorithm to perform the following steps: (1) <i>set the mode and strength to [default values or] values represented by selections made by user input to the user input features</i>, (2) <i>provide a corresponding output to the power supply</i>, and (3) provide a corresponding output to the H-bridge switch. EX1001, 7:20–34, 8:20–30, Fig. 7A, Fig. 7C.

64. The “default values or” language in brackets applies to the '830 patent only. I agree that the Patent Owner's proposed structures from the district court joint claim construction chart are each structures that perform the function of the claimed “control component.” I understand that Patent Owner contends that when the corresponding structure is an oscillator circuit or a microcontroller with internal or external memory, an algorithm is not required. I understand that the “oscillator circuit” corresponding structure refers, not to

⁸ Ex. 2012 at 32-33; IPR2023-00992 Petition at 7; IPR2023-00993 Petition at 8 (emphasis added).

all prior art oscillators, but rather to the embodiment described in the patent that includes an “oscillator circuit with additional control circuitry” as described in the specification.⁹

65. The parties agree that when the corresponding structure is a processor (including, in Resonant’s proposal, a CPU or microprocessor), an algorithm is required. I agree. The parties do not agree on all the algorithm steps, but as I have emphasized in the table above, the parties agree that the algorithm steps must include steps of setting mode and strength and providing a corresponding output to the power supply. In particular, Samsung contends that the claimed algorithm includes the step of “provide a corresponding output to the power supply” and Resonant contends that the algorithm includes the step of “provide a corresponding output to the power supply so that the power supply provides a corresponding output to the driving component.” Under either proposal, an output to the power supply is required. I agree that a step of providing an output to the power supply is necessary to performing the function of the “control component” of Claim 1 in these two patents when the corresponding structure is a processor, CPU, or microprocessor, and that such a step should be included in any construction involving an algorithm.

⁹ ’081 Patent at 11:43-13:2; ’830 Patent at 11:57-13:19.

66. Samsung’s proposed construction of “control component” in the Petition, but not in the district court action, also requires an “H Bridge Switch” and providing a “corresponding output to the H-bridge switch.”¹⁰ I do not present an opinion whether or not the “H bridge switch” is part of the corresponding structure for the “control component” of claim 1. As I explain below, if the Board accepts Samsung’s contention that the “H bridge switch” is part of the corresponding structure for “control component” and that the control component must provide a corresponding output to the H-bridge switch, then Dr. Wolfe and the Petitions fail to show such structures in the prior art.

2. Claims 3 and 4

67. In the district court joint claim construction chart, the parties agree that the “control component” terms of claims 3 and 4 are subject to § 112 ¶ 6, they agree on the claimed function, and they partially agree on the corresponding structures from the patent, as summarized below¹¹:

Patent Owner’s Proposed Structure in District Court	Petitioners’ Proposed Structure in District Court and Petitions
oscillator circuit; microcontroller with internal or external memory; processor; CPU; microprocessor; and equivalents thereof [if an algorithm is required] Where the corresponding structure is a processor, CPU, or microprocessor, the processor/CPU/microprocessor is programmed with an	Claim 1 structure with the processor further programmed with an algorithm to perform the following steps: (1) convert the received output signal into an integer, (2) <i>compare that integer to a specific value</i> , (3) <i>adjust one or more operational control outputs based on that comparison</i> . ’081 Patent at 7:13-18, 7:32-

¹⁰ IPR2023-00992 Petition at 7; IPR2023-00993 Petition at 8.

¹¹ Ex. 2012 at 32-33; IPR2023-00992 Petition at 7-8; IPR2023-00993 Petition at 8 (emphasis added).

Patent Owner's Proposed Structure in District Court	Petitioners' Proposed Structure in District Court and Petitions
algorithm comprising the following steps: (a) receive the value of an output signal; (b) <i>compare that value to a different value, which could be a previous value</i> ; and (c) <i>adjust one or more operational control outputs based on that comparison</i>	8:9, Figs. 7A, 7B; '830 Patent at 7:23-29, 7:42-8:19, Figs. 7A, 7B.

68. Here, Samsung's position in the district court is the same as the positions in the Petitions. The issues regarding "oscillator circuit" and "microcontroller with internal or external memory" are the same as with Claim 1, discussed above.

69. Under Samsung's proposed construction of "control component" in claim 3 of each patent, the algorithm must perform steps including "(1) convert[ing] the received output signal into an integer, (2) compar[ing] that integer to a specific value." Resonant's proposal includes steps paralleling Samsung's proposal. In particular, Resonant proposes steps of "(a) receive the value of an output signal; (b) compare that value to a different value, which could be a previous value." In my opinion Resonant's characterization is the more accurate. I do not present an opinion here which of Resonant's or Samsung's proposals is the correct construction. But in my opinion, when the corresponding structure for this limitation includes an algorithm, that algorithm must include either Samsung's proposed steps (1) and (2) or Resonant's proposed steps (a) and (b).

70. In other words, an algorithm that did not include a step of either converting the received output signal into an integer (Samsung’s proposed step (1)) or receiving the value of an output signal (Resonant’s proposed step (a))) would not be sufficient to perform the claimed function. Likewise, an algorithm that did not either a step of either comparing the integer to a specific value (Samsung’s proposed step (2)) or comparing the value to a different value (Resonant’s proposed step (b)) would not be sufficient to perform the claimed function. The Board must therefore, in my opinion, adopt either Samsung’s or Resonant’s proposed algorithm if the corresponding structure is a processor, CPU, or microprocessor. As I explain below, if the Board adopts Samsung’s proposed construction, the Dr. Wolfe and the Petitions fail to show steps (1) and (2).

D. Claims 4–6

71. In my opinion, claim 4 of each of the ’081 and ’830 patents contains a clear typographical error in the identification of which claim each depends from. In each patent, claim 3 introduces limitations of “sensors” and “one or more operational control outputs of the control component.”¹² The very next

¹² ’081 patent at 15:62–67; ’830 patent at 16:15–20.

claim in each patent then refers to “the sensors” and “the one or more operational control outputs.”¹³ Ordinarily, use of “the” in this manner in a patent claim indicates a reference to a “sensor” or “one or more operational control outputs of the control component” that was introduced in a parent claim or earlier in the same claim. The natural conclusion is that these terms in claim 4 of each patent are meant to refer to the corresponding terms in claim 3 of each patent, and thus that claim 4 in each patent was means to depend on claim 3.

72. Therefore, in my opinion, claim 4 of each patent should be interpreted as depending from claim 3, and the statement that each instead depends from 1 should be understood as a typographical error that can be corrected. Alternatively, claim 4 in each patent could be interpreted as though the word “the” did not appear before “sensors” and “one or more operational control outputs of the control component,” as Petitioners propose as a possible interpretation of the claims.¹⁴

73. I do not see the difference between the two interpretations of claim 4 (and thus of claims 5–6) in each patent considered in the Petitions¹⁵ as one that needs to be resolved by the Board, as I see no issues in the obviousness

¹³ ’081 patent at 16:1–7; ’830 patent at 16:21–27.

¹⁴ IPR2023-00992 Petition at 8; IPR2023-00993 Petition at 9.

¹⁵ IPR2023-00992 Petition at 8; IPR2023-00993 Petition at 9.

grounds presented in these IPRs where resolving this dispute would make a difference to the outcome.

IX. OBVIOUSNESS

A. Ground 1A: Fukumoto claims 1–3, 7–9, 15, 17, 20

1. Claim 1

74. As discussed above, the term “control component” in claim 1 of each patent, and in claims 19 and 20 of the ’830 patent, is properly construed as a means-plus-function term governed by 35 U.S.C. § 112 ¶ 6. Both Samsung and Resonant Systems agree on this point. They both also agree on the respective corresponding functions for this term in the two patents.¹⁶

75. As to the corresponding structures, Samsung argues that the corresponding structure requires a processor programmed with an algorithm.¹⁷ Resonant System argues that the corresponding structures are “oscillator circuit; microcontroller with internal or external memory; processor; CPU; microprocessor.”¹⁸ For at least the processor, CPU, and microprocessor cases, Resonant System agrees that the structure must include a disclosed algorithm or its equivalent.¹⁹

¹⁶ IPR2023-00992 Petition at 7; IPR2023-00993 Petition at 8.

¹⁷ IPR2023-00992 Petition at 7; IPR2023-00993 Petition at 8.

¹⁸ Section VIII.C above.

¹⁹ Section VIII.C above.

76. To the extent that the Board agrees that the corresponding structures include oscillator circuits or microcontrollers and that they do not require any particular algorithm, the asserted prior art fails to disclose such a structure, and the petitions fail to show that a POSITA would be motivated to use such a structure to perform the required function.

77. Neither Fukumoto nor the petitions mention a microcontroller. Dr. Wolfe’s declarations mention microcontrollers solely in his section on the background of the technology, without suggesting any particular relevance to the prior art or invalidity grounds.²⁰

78. Fukumoto does not mention an oscillator circuit. The petitions only mention oscillator circuits as structures that purportedly would have been equivalent to the H-bridge switch required as a part of the corresponding structure for “control component” under Samsung’s construction.²¹ Samsung does not present any evidence that any prior art oscillator circuit alone could perform the claimed function for the “control component.” None of the oscillators or related circuit discussed by Dr. Wolfe would perform the full function of “controlling supply of power from the power supply to the driving compo-

²⁰ IPR2023-00992, Ex. 1003, ¶ 69; IPR2023-00993, Ex. 1003, ¶ 69.

²¹ IPR2023-00992 Petition at 7, 22; IPR2023-00993 Petition at 8, 22.

ment to cause the moveable component to oscillate at a frequency and an amplitude specified by one or more stored values.”²² Samsung had every opportunity to argue that some form of oscillator circuit taught or rendered obvious by the prior art satisfied the “control component” limitation but chose not to. In particular, claim 2 of each patent provides two alternative ways of satisfying the “control component,” one of which is “an variable oscillator circuit with additional control circuitry.”²³ But Samsung only argued that the prior art disclosed or made obvious the other alternative way of satisfying the claim 2 “control component.”²⁴

79. For the corresponding structures involving a processor, CPU, or microprocessor, both Resonant Systems and Samsung agree that these structures must include an algorithm and that this algorithm must include at least the step of “provide a corresponding output to the power supply” or “provide a corresponding output to the power supply so that the power supply provides a corresponding output to the driving component.”²⁵ In other words, the “power supply” of limitation 1[c] in each patent must be capable of being provided an output, and the “control component” of limitation 1[f] must be

²² IPR2023-00992, Ex. 1003, ¶¶ 184–187; IPR2023-00993, Ex. 1003, ¶ 179–182.

²³ ’081 patent at 15:51–52; ’830 patent at 16:3–4.

²⁴ IPR2023-00992 Petition at 23–24; IPR2023-00993 Petition at 23–24.

²⁵ Section VIII.C above.

capable of providing such an output to the power supply. Samsung’s petition fails to show that this is disclosed or rendered obvious by Fukumoto.

80. Both the petitions and the Wolfe declarations that they rely upon argue that it is taught or would have been obvious to include a power supply in Fukumoto because Fukumoto teaches that its actuator uses “power.”²⁶ Nowhere in its discussion of limitation 1[c] (or the corresponding limitations in other claims) does Samsung explain what the structure of the power supply would be or address the question of whether it can accept an output from a processor or other component.²⁷ In fact, the only example of a specific source of power Samsung suggests would be used in Fukumoto is a “battery.”²⁸

81. Fukumoto depends from patent applications filed in 2000 and 2001, and its Figure 3 shows a personal digital assistant or “PDA.”²⁹ PDAs of that time indeed used batteries, such as the AAA alkaline batteries shown in the manual for the Palm m100 Handheld³⁰:

²⁶ IPR2023-00992 Petition at 15–16; IPR2023-00993 Petition at 15–16; IPR2023-00992, Ex. 1003, ¶ 169; IPR2023-00993, Ex. 1003, ¶ 165.

²⁷ See ’081 patent, Fig. 6; ’830 patent, Fig. 6.

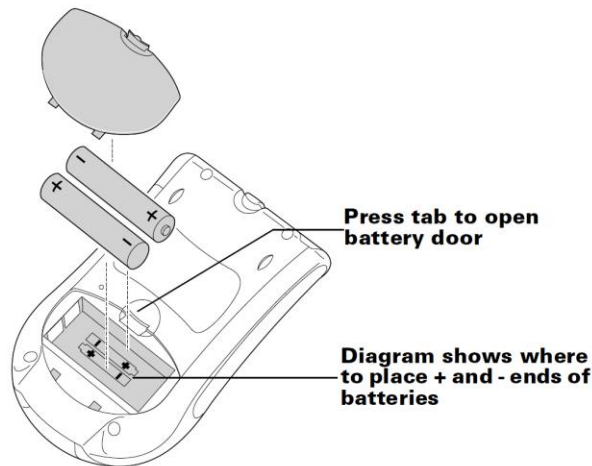
²⁸ IPR2023-00992 Petition at 22–23; IPR2023-00993 Petition at 22–23.

²⁹ Ex. 1005 at cover, 9:65–67.

³⁰ Ex. 2013, “Getting Started with the Palm m100 Handheld,” p. ii, p. 2.

Installing batteries

1. Press the latch on the battery door and lift the battery door away from your handheld.



2. Install two AAA alkaline batteries into the battery compartment.
3. Insert the battery door back into place so that it is flush with the back of your handheld and "clicks" into position.

82. As is well-known even to people with no technical training, a AAA-size alkaline battery has two terminals, + and –, through which it supplies voltage and current. It has no input to receive an output from a processor. Samsung has not identified any prior art battery that would have been capable of receiving an output from a processor, and has not provided any evidence that a POSITA would have been motivated to use such a battery with Fukumoto, rather than a conventional alkaline battery or other conventional two-terminal battery.

83. Samsung's discussion of limitation 1[f] fails to show that the "control component" Samsung identifies in Fukumoto would have provided an output to the power supply. Samsung's evidence for this is the statement in Fukumoto

that “the CPU **113** instructs the drive signal generation circuit **114** to generate a drive signal (step **S103**)” and “the drive signal generation circuit **114** generates a drive signal using the waveform data supplied from the CPU **113**.”³¹ But nothing in this statement suggests that the instruction from the CPU is provided to the power supply. Nothing that Samsung points to indicates that the battery or other power supply is a part of the drive signal generation circuit, or even if it is, that the power supply would be receiving any output provided by the CPU.

84. In other words, Samsung has failed to show that the prior art teaches—or that a POSITA would have modified the prior art to contain—a power supply that satisfies the requirements of limitations 1[c] and 1[f], under Samsung’s proposed construction of “control component” or under any other construction that requires providing an output to the power supply.

85. Furthermore, Samsung’s proposed construction of “control component” requires an “H Bridge Switch” and providing a “corresponding output to the H-bridge switch.”³² I do not believe that it is necessary for the Board to

³¹ Ex. 1005, Fukumoto at 17:20–26; IPR2023-00992 Petition at 22; IPR2023-00993 Petition at 22; IPR2023-00992, Ex. 1003, ¶ 189; IPR2023-00993, Ex. 1003, ¶ 183.

³² IPR2023-00992 Petition at 7; IPR2023-00993 Petition at 8.

determine whether these features are actually required in the “control component,” because Samsung’s failure to show output to the power supply fully resolves the issues. But to the extent that the Board does find that Samsung’s proposed construction is correct, Samsung does not show that a POSITA would have been motivated to include the “provide a corresponding output to the H-bridge switch” step or an equivalent to that step.

86. Samsung appears to argue that the “oscillator circuits” and “inverters” that it contends could have been used in Fukumoto are equivalent to an H-bridge switch, and that for this reason a device utilizing such alternatives to the H-bridge switch would have implemented a step equivalent to the step of providing an output to the H-bridge switch.³³ But, Samsung’s only support for this is a conclusory opinion from Dr. Wolfe.³⁴ The actual examples of oscillator circuits and inverters that Dr. Wolfe describes have no inputs that would permit them to accept any inputs from a processor, let alone inputs equivalent to those a processor would provide to a H-bridge switch.³⁵ To the extent that any prior art algorithms or circuits satisfy the third step of the algorithm in Samsung’s “control component” construction, Samsung has failed to show

³³ IPR2023-00992 Petition at 22–23; IPR2023-00993 Petition at 22–23.

³⁴ IPR2023-00992, Ex. 1003, ¶ 189; IPR2023-00993, Ex. 1003, ¶ 183.

³⁵ IPR2023-00992, Ex. 1003, ¶ 184, 185, 187; IPR2023-00993, Ex. 1003, ¶ 179, 180, 182.

that a POSITA would be motivated to use those specific algorithms or circuit in Fukumoto for this further reason has failed to show that Fukumoto discloses or renders obvious the “control component” of claim 1[f] and similar claims.

2. Claim 2

87. Claim 2 of each patent depends from claim 1. Therefore, Fukumoto fails to render claim 2 of each patent obvious for at least the same reasons that it fails to render claim 1 obvious.

3. Claim 3

88. Claim 3 of each patent depends from claim 1. Therefore, Fukumoto fails to render claim 3 of each patent obvious for at least the same reasons that it fails to render claim 1 obvious.

89. In addition, the petitions acknowledge that Fukumoto does not render claim 3 obvious under a means-plus-function construction of “control component” in claim 3.³⁶ As discussed above, the term “control component” should indeed be given a means-plus-function construction.³⁷

³⁶ IPR2023-00992 Petition at 24; IPR2023-00993 Petition at 24.

³⁷ Section VIII.C above.

4. Claim 7

90. Claim 7 of each patent depends from claim 1. Therefore, Fukumoto fails to render claim 7 of each patent obvious for at least the same reasons that it fails to render claim 1 obvious.

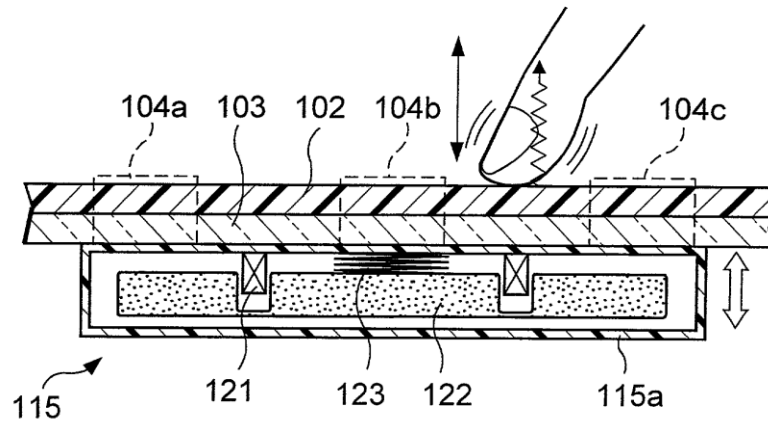
5. Claim 8

91. Claim 8 of each patent depends from claim 1. Therefore, Fukumoto fails to render claim 8 of each patent obvious for at least the same reasons that it fails to render claim 1 obvious.

92. In addition, Samsung fails to provide an adequate motivation to modify Fukumoto's Figure 3 embodiment based upon its Figure 83 embodiment. The petitions and Dr. Wolfe's declarations assert without evidence or explanation that using multiple springs would "dampen the vibration forces without damaging other components (e.g., the screen)."³⁸ But Fukumoto Figure 3 already has structures between the weight 122 and the screen 103, including the spring 123, coil 121, and case 115a:

³⁸ IPR2023-00992 Petition at 29–30; IPR2023-00993 Petition at 29–30; IPR2023-00992, Ex. 1003, ¶ 202; IPR2023-00993, Ex. 1003, ¶ 197.

FIG. 3



93. Samsung fails to explain how the weight could damage the screen or other components in spite of these structures keeping them separate, or how the addition of a second spring would make damage less likely.

94. Samsung also asserts a POSITA would have been motivated to add the second spring “to double the force of vibration created for greater effect while requiring less power.”³⁹ But neither the petitions nor Dr. Wolfe’s declarations provide any evidence or explanation for how increasing the force and effect of vibration would reduce the power required. It is a fact of introductory physics that the power required to move an object equals the force on the object times its speed. As a result, doubling the force on an object while keeping the

³⁹ IPR2023-00992 Petition at 29–30; IPR2023-00993 Petition at 29–30; IPR2023-00992, Ex. 1003, ¶ 202; IPR2023-00993, Ex. 1003, ¶ 197.

distance and speed it moves the same is going to roughly double power consumption. While the actual power consumption will depend on the details of the design, there is no reason to expect that increasing forces will *decrease* power requirements.

95. As for the statement about the benefit of doubling the force and effect of vibration, Fukumoto correctly attributes that result to doubling the electrostatic force by doubling the number of electrodes.⁴⁰ Doubling the number of springs without changing the force that drives the oscillations is not likely to increase the vibrations. Samsung particularly fails to explain how Fukumoto's teaching that doubling the number of electrodes in an electrostatic embodiment increases vibrations would motivate changing the number of springs in an electromagnetic system such as Fukumoto Figure 3.

6. Claim 9

96. Claim 9 of each patent depends from claim 1. Therefore, Fukumoto fails to render claim 9 of each patent obvious for at least the same reasons that it fails to render claim 1 obvious.

⁴⁰ Ex. 1005, Fukumoto at 50:4–13.

7. Claim 15

97. Claim 15 of each patent depends from claim 1. Therefore, Fukumoto fails to render claim 15 of each patent obvious for at least the same reasons that it fails to render claim 1 obvious.

8. Claim 17

98. Claim 17 of each patent depends from claim 1. Therefore, Fukumoto fails to render claim 17 of each patent obvious for at least the same reasons that it fails to render claim 1 obvious.

9. Claim 20

99. Claim 20 of the '830 patent includes each of the limitations of claim 1, adding an additional “wherein” clause. Therefore, Fukumoto fails to render claim 20 of each patent obvious for at least the same reasons that it fails to render claim 1 obvious.

B. Ground 1B: Fukumoto and Grant claims 1–3, 7–9, 15, 17, and 20

1. Claim 1

100. The proposed combination of Fukumoto and Grant does not disclose or render obvious claim 1. The proposed combination relies on Fukumoto for

element 1[c] (“a power supply”) and relies on “Fukumoto’s control component” for element 1[f].⁴¹ Just as Petitioners failed to establish that Fukumoto renders obvious a power supply that can receive an output from the control component (required under all proposed constructions for “control component”) or that it renders obvious the control component providing an output to an H-bridge (required at least under Petitioner’s IPR construction for “control component”), they have also failed to establish that the combination of Fukumoto and Grant renders these things obvious.

2. Claims 2–3, 7–9, 15, and 20

101. Claim 2–3, 7–9, and 15 of each patent depends from claim 1. Claim 20 of the ’830 patent includes each of the limitations of claim 1, with the addition of the “wherein” limitation. Therefore, the combination of Fukumoto and Grant fails to render each of these claims obvious for at least the same reasons that it fails to render claim 1 obvious.

102. In addition, the petitions rely solely on Fukumoto to satisfy the limitations of the dependent claims and the “wherein” limitation of claim 20. Therefore, the combination of Fukumoto and Grant fails to render each of claim 3, 8, 9, and 17 obvious for at least the same reasons that Fukumoto fails to render these claims obvious as discussed above.

⁴¹ IPR2023-00992 Petition at 35–36; IPR2023-00993 Petition at 35–36.

3. Claim 17

103. Claim 17 of each patent depends from claim 1. Therefore, the combination of Fukumoto and Grant fails to render claim 17 of each patent obvious for at least the same reasons that it fails to render claim 1 obvious.

C. Ground 1C: Fukumoto and Barton claims 1–3, 7–9, 15, 17, and 20

1. Claim 1

104. The proposed combination of Fukumoto and Barton does not disclose or render obvious claim 1. The proposed combination relies on Fukumoto for element 1[c] (“a power supply”) and relies on “Fukumoto’s control component” for element 1[f].⁴² Just as Petitioners failed to establish that Fukumoto renders obvious a power supply that can receive an output from the control component (required under all proposed constructions for “control component”) or that it renders obvious the control component providing an output to an H-bridge (required at least under Petitioner’s IPR construction for “control component”), they have also failed to establish that the combination of Fukumoto and Grant renders these things obvious.

⁴² IPR2023-00992 Petition at 39, 43; IPR2023-00993 Petition at 39, 43.

2. Claims 2–3, 7–9, 15, and 20

105. Claim 2–3, 7–9, and 15 of each patent depends from claim 1. Claim 20 of the '830 patent includes each of the limitations of claim 1, with the addition of the “wherein” limitation. Therefore, the combination of Fukumoto and Barton fails to render each of these claims obvious for at least the same reasons that it fails to render claim 1 obvious.

106. In addition, the petitions rely solely on Fukumoto to satisfy the limitations of the dependent claims and the “wherein” limitation of claim 20. Therefore, the combination of Fukumoto and Barton fails to render each of claim 3, 8, 9, and 17 obvious for at least the same reasons that Fukumoto fails to render these claims obvious as discussed above.

3. Claim 17

107. Claim 17 of each patent depends from claim 1. Therefore, the combination of Fukumoto and Barton fails to render claim 17 of each patent obvious for at least the same reasons that it fails to render claim 1 obvious.

D. Ground 1D: Fukumoto and Ueda claims 1–6

108. Each of claims 3–6 depends directly, or indirectly, on claim 1. The proposed combination relies on solely on Fukumoto to satisfy claim 1.⁴³ Therefore, the combination fails to render claims 3–6 obvious for at least the same

⁴³ IPR2023-00992 Petition at 45–56; IPR2023-00993 Petition at 45–56.

reasons that Fukumoto fails to render claim 1 obvious, as discussed for Ground 1A above.

109. Under Samsung’s proposed construction of “control component” in claim 3 of each patent, the algorithm must perform steps including “(1) convert[ing] the received output signal into an integer, (2) compar[ing] that integer to a specific value.”⁴⁴ Samsung relies on Ueda to purportedly satisfy these steps for the “control component.”⁴⁵ But Ueda never mentions any integer, nor suggests that any of the values relied on by Samsung is an integer. Beyond reciting the steps of Samsung’s proposed construction, Samsung’s petitions and Dr. Wolfe’s declarations never mention integers in the context of Ueda, either, nor do they provide any evidence that a POSITA would be motivated to modify Ueda’s teachings to utilize an integer value.⁴⁶ At least to the extent that the Board adopts Samsung’s proposed construction of “control component” in claims 3 and 4, Samsung has failed to show Fukumoto and/or Ueda render this limitation obvious. Because each of claims 3–6 contains this limitation and/or depends from a claim that does, Samsung has failed to show that the combination of Fukumoto and Ueda renders any of claims 3–6 obvious.

⁴⁴ IPR2023-00992 Petition at 7–8; IPR2023-00993 Petition at 8.

⁴⁵ IPR2023-00992 Petition at 50–51; IPR2023-00993 Petition at 50–51.

⁴⁶ IPR2023-00992 Petition at 50–51; IPR2023-00993 Petition at 50–51; IPR2023-00992, Ex. 1003, ¶¶ 245–246; IPR2023-00993, Ex. 1003, ¶¶ 241–242.

E. Grounds 1E-F: Fukumoto-Grant or Fukumoto-Barton and Ueda claims 1–6

110. Section VII.D of each petition mentions grounds 1E and 1F in its title, but each addresses grounds 1E and 1F with just a single sentence, saying claims 3–6 would be obvious over these combinations “for the same reasons” as 1D and citing Dr. Wolfe’s declaration.⁴⁷ Nowhere else in Section VII.D of either petition is Grant or Barton mentioned.⁴⁸ Nowhere do the petitions say what would be combined from each of the three references in each combination, and nowhere do the petitions identify a motivation to make these three-reference combinations.

111. To the extent that the Ground 1E combination relies upon the same combination of Fukumoto and Grant as Ground 1B to satisfy claim 1, the Ground 1E combination fails to render elements 1[c] and 1[f] obvious for at least the same reasons as discussed in connection with Ground 1A and Ground 1B above.

112. To the extent that the Ground 1F combination relies upon the same combination of Fukumoto and Barton as Ground 1C to satisfy claim 1, the Ground 1F combination fails to render elements 1[c] and 1[f] obvious for at least the

⁴⁷ IPR2023-00992 Petition at 45; IPR2023-00993 Petition at 45.

⁴⁸ IPR2023-00992 Petition at 45–56; IPR2023-00993 Petition at 45–56.

same reasons as discussed in connection with Ground 1A and Ground 1C above.

113. To the extent that Grounds 1E and 1F rely upon the same combination of Fukumoto and Ueda to satisfy the limitations of claims 3–6 as Ground 1D, the Ground 1E and Ground 1F combinations fail to render these limitations obvious for at least the same reasons as discussed in connection with Ground 1D above.

F. Ground 1G: Fukumoto and Erixon claims 7 and 8

114. Each of claims 7 and 8 depends directly on claim 1. The proposed combination relies on solely on Fukumoto to satisfy claim 1.⁴⁹ Therefore, the combination fails to render claims 7 and 8 obvious for at least the same reasons that Fukumoto fails to render claim 1 obvious, as discussed for Ground 1A above.

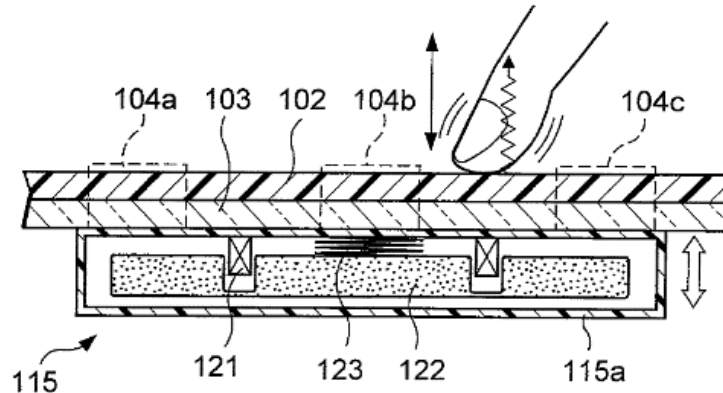
115. The petitions also fail to establish a motivation to combine Fukumoto and Erixon. The argument they make for motivation to combine is based upon replacing Fukumoto’s vibrating structure with that from Erixon being a “simple substitution.”⁵⁰

⁴⁹ IPR2023-00992 Petition at 56–64; IPR2023-00993 Petition at 56–64.

⁵⁰ IPR2023-00992 Petition at 59–60; IPR2023-00993 Petition at 59–60.

116. The designs of Fukumoto and Erixon are literally orthogonal in that Fukumoto's design is such that the vibration of the moving element is transmitted to the axial end of the device:

FIG. 3



“Note that the portion of the case **115 a** to which the spring **123** is connected receives a vibration component transmitted from the movable weight **122** through the spring **123**,” (col. 14: 63-66). As a result, the vibration is primarily transmitted to the screen and the finger touching it, as opposed to other parts of the device.

117. Furthermore, Fukumoto teaches that “The direction of the vibration is a direction perpendicular to the front surface of the touch panel **102** and matches with the direction by which the user presses the touch panel **102** or any one of the operation keys **104a** to **104c** and its opposite direction. Due to this, the touch panel **102** and the operation keys **104a** to **104c** vibrate in a direction perpendicular to the front surface of the touch panel **102** and vibration

is transmitted to the fingertip of the user performing the operation input.” In other words, movement specifically in the direction perpendicular to the screen surface is essential to create the key-press haptic sensation desired in Fukumoto.

118. In order to fit Erixon’s tube-shaped vibrator into the Fukumoto Figure 3 PDA without substantially increasing the thickness of the device, the direction of vibration would be oriented parallel to the screen, not perpendicular, resulting in a haptic sensation very different from that of pressing a button:

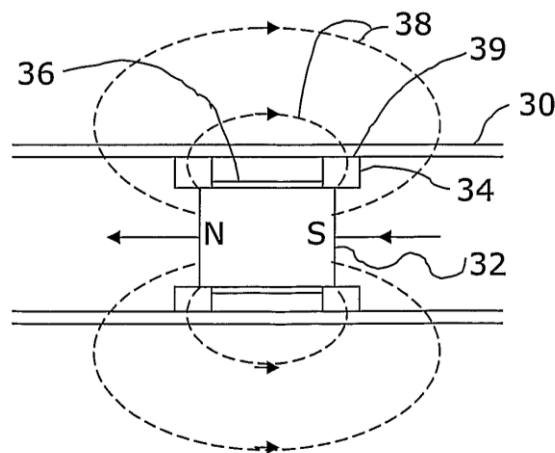


FIG. 3

119. With this design, the vibration will be equally transmitted to the front back and sides of the device. To achieve Fukomoto’s design goal of transmitting the vibration to the touch screen would require inventive steps causing most of Erixon’s design’s vibrations to convey to one side of its housing. Be-

cause it produces vibrations in a different direction and transmits them in different directions within the device, Erixon's structure cannot be simply substituted into Fukumoto's design, with an expectation of acceptable performance.

120. I note that the '081 and '830 patents performed these inventive steps, to convey vibration to the axial sides of its housing: "FIG. 12 shows yet an alternative LRVM an implementation of the linear-resonant vibration module to which current application is directed. In this alternative implementation, additional coils **1202** and **1204** are incorporated in the moving mass, and a centering magnet or coil **1206** is positioned in a fixed location on the housing so that, when the direction of the current applied to the coils **1202** and **1204** is alternated, an oscillating rotational force is generated to cause the movable weight to oscillate both in a plane perpendicular to the axis of the chamber as well as linearly oscillating the direction of the chamber." ('081 patent at 9:28-38). Thus the inventors of the patents contemplated and designed for conveying vibrations to the sides of its design tube. No such inventive steps or motivation to make them are shown in Erixon, and thus no combination of Erixon and Fukumoto could be expected to produce this geometric incorporation.

G. Grounds 1H-I: Each of Fukumoto-Grant or Fukumoto-Barton and Erixon claims 7 and 8

121. Section VII.E of each petition mentions grounds 1H and 1I in its title, but each addresses grounds 1H and 1I with just a single sentence, saying claim 7 and 8 would be obvious over these combinations “for the same reasons” as 1G and citing Dr. Wolfe’s declaration.⁵¹ Nowhere else in Section VII.E of either petition is Grant or Barton mentioned.⁵² Nowhere do the petitions say what would be combined from each of the three references in each combination, and nowhere do the petitions identify a motivation to make these three-reference combinations.

122. To the extent that the Ground 1H combination relies upon the same combination of Fukumoto and Grant as Ground 1B to satisfy claim 1, the Ground 1H combination fails to render elements 1[c] and 1[f] obvious for at least the same reasons as discussed in connection with Ground 1A and Ground 1B above.

123. To the extent that the Ground 1I combination relies upon the same combination of Fukumoto and Barton as Ground 1C to satisfy claim 1, the Ground 1I combination fails to render elements 1[c] and 1[f] obvious for at least the

⁵¹ IPR2023-00992 Petition at 56; IPR2023-00993 Petition at 56.

⁵² IPR2023-00992 Petition at 56–64; IPR2023-00993 Petition at 56–64.

same reasons as discussed in connection with Ground 1A and Ground 1C above.

124. To the extent that Grounds 1H and 1I rely upon the same combination of Fukumoto and Erixon to satisfy the limitations of claims 7 and 8 as Ground 1G, the Ground 1H and Ground 1I combinations fail to render these limitations obvious for at least the same reasons as discussed in connection with Ground 1G above.

H. Ground 1J: Fukumoto and Fuller claim 8

125. Claim 8 depends directly on claim 1. The proposed combination relies on solely on Fukumoto to satisfy claim 1.⁵³ Therefore, the combination fails to render claim 8 obvious for at least the same reasons that Fukumoto fails to render claim 1 obvious, as discussed for Ground 1A above.

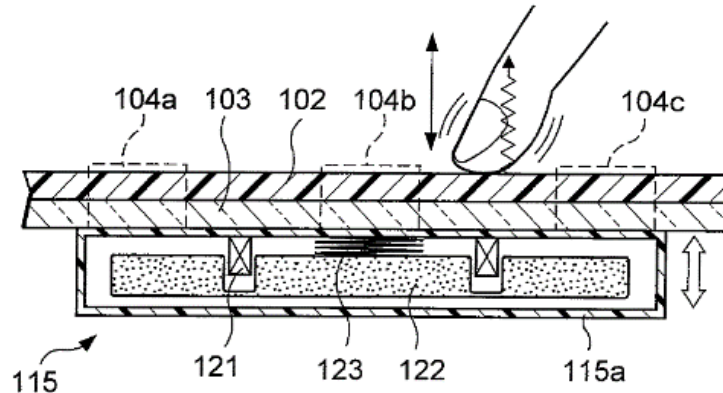
126. The petitions also fail to establish a motivation to combine Fukumoto and Fuller. The argument they make for motivation to combine is based upon replacing Fukumoto’s vibrating structure with that from Erixon being a “simple substitution.”⁵⁴

⁵³ IPR2023-00992 Petition at 64–66; IPR2023-00993 Petition at 64–66.

⁵⁴ IPR2023-00992 Petition at 66; IPR2023-00993 Petition at 66.

127. The designs of Fukumoto and Fuller are literally orthogonal in that Fukumoto's design is such that the vibration of the moving element is transmitted to the axial end of the device:

FIG. 3



“Note that the portion of the case **115 a** to which the spring **123** is connected receives a vibration component transmitted from the movable weight **122** through the spring **123**,” (col. 14: 63-66). As a result, the vibration is primarily transmitted to the screen and the finger touching it, as opposed to other parts of the device. Conversely Fuller's design is to convey the vibration through the axial sides of the device: “That is, the mass of the moveable magnet, and its oscillatory movement from one end to another along an axial pathway results in vibrations being transmitted from the housing or other support to an external environment.” [0005].

128. Furthermore, Fukumoto teaches that “The direction of the vibration is a direction perpendicular to the front surface of the touch panel **102** and

matches with the direction by which the user presses the touch panel **102** or any one of the operation keys **104a** to **104c** and its opposite direction. Due to this, the touch panel **102** and the operation keys **104a** to **104c** vibrate in a direction perpendicular to the front surface of the touch panel **102** and vibration is transmitted to the fingertip of the user performing the operation input.” In other words, movement specifically in the direction perpendicular to the screen surface is essential to create the key-press haptic sensation desired in Fukumoto.

129. In order to fit Fuller’s tube-shaped electromagnetic vibrator into the Fukumoto Figure 3 PDA without substantially increasing the thickness of the device, the direction of vibration would be oriented parallel to the screen, not perpendicular, resulting in a haptic sensation very different from that of pressing a button:

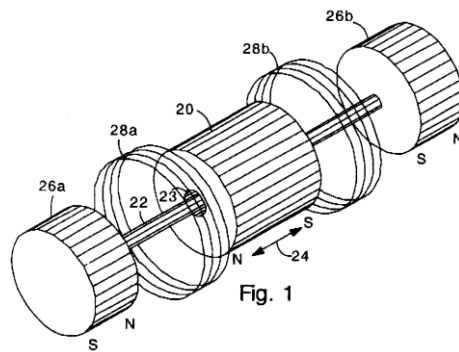


Fig. 1

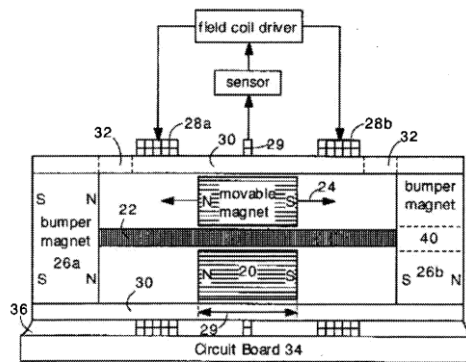


Fig. 2

130. With this design, the vibration will be equally transmitted to the front back and sides of the device. To achieve Fukomoto's design goal of transmitting the vibration to the touch screen would require inventive steps causing most of Fuller's design's vibrations to convey to one side of its housing. Because it produces vibrations in a different direction and transmits them in different directions within the device, Fuller's structure cannot be simply substituted into Fukomoto's design, with an expectation of acceptable performance.

131. I note that the '081 and '830 patents performed these inventive steps, to convey vibration to the axial sides of its housing: "FIG. 12 shows yet an

alternative LRVM an implementation of the linear-resonant vibration module to which current application is directed. In this alternative implementation, additional coils **1202** and **1204** are incorporated in the moving mass, and a centering magnet or coil **1206** is positioned in a fixed location on the housing so that, when the direction of the current applied to the coils **1202** and **1204** is alternated, an oscillating rotational force is generated to cause the movable weight to oscillate both in a plane perpendicular to the axis of the chamber as well as linearly oscillating the direction of the chamber.” (’081 patent at 9:28-38). Thus the inventors of the patents contemplated and designed for conveying vibrations to the sides of its design tube. No such inventive steps or motivation to make them are shown in Fuller, and thus no combination of Fuller and Fukumoto could be expected to produce this geometric incorporation.

I. Grounds 1K-L: Each of Fukumoto-Grant or Fukumoto-Barton and Fuller claim 8

132. Section VII.F of each petition mentions grounds 1K and 1L in its title, but each addresses grounds 1K and 1L with just a single sentence, saying claim 8 would be obvious over these combinations “for the same reasons” as 1J and citing Dr. Wolfe’s declaration.⁵⁵ Nowhere else in Section VII.F of either

⁵⁵ IPR2023-00992 Petition at 64; IPR2023-00993 Petition at 64.

petition is Grant or Barton mentioned.⁵⁶ Nowhere do the petitions say what would be combined from each of the three references in each combination, and nowhere do the petitions identify a motivation to make these three-reference combinations.

133. To the extent that the Ground 1K combination relies upon the same combination of Fukumoto and Grant as Ground 1B to satisfy claim 1, the Ground 1K combination fails to render elements 1[c] and 1[f] obvious for at least the same reasons as discussed in connection with Ground 1A and Ground 1B above.

134. To the extent that the Ground 1L combination relies upon the same combination of Fukumoto and Barton as Ground 1C to satisfy claim 1, the Ground 1L combination fails to render elements 1[c] and 1[f] obvious for at least the same reasons as discussed in connection with Ground 1A and Ground 1C above.

135. To the extent that Grounds 1K and 1L rely upon the same combination of Fukumoto and Fuller to satisfy the limitations of claim 8 as Ground 1J, the Ground 1K and Ground 1L combinations fail to render these limitations obvious for at least the same reasons as discussed in connection with Ground 1J above.

⁵⁶ IPR2023-00992 Petition at 64–66; IPR2023-00993 Petition at 64–66.

J. Ground 1M: Fukumoto and Dong-Ogusu claims 14 and 19

136. Claim 14 of each patent depends directly on claim 1. Claim 19 of the '830 patent contains the same limitations as claim 1, with an additional limitation that matches the limitation of claim 14. The proposed combination relies on solely on Fukumoto to satisfy claim 1.⁵⁷ Therefore, the combination fails to render claims 14 and 19 obvious for at least the same reasons that Fukumoto fails to render claim 1 obvious, as discussed for Ground 1A above.

137. Claim 14's limitation of the use of paramagnetic materials to reduce the reluctance of the magnetic circuit is not shown by Fukumoto, by Ogusu, by Dong, or by any hypothetical combination of them.

138. Paramagnetic materials are materials, generally elements, that have an unpaired electron in the outer atomic electron shell. Since electrons have spin, such a paramagnetic material with an unpaired and thus not-cancelled spin will become magnetized in the presence of a magnetic field due to alignment of the electron spins, but only temporarily. Once the magnetic field is removed, the paramagnetic material will return to its unmagnetized state. Thus paramagnetic materials can be very useful in magnetic circuits since they can affect the magnetic fields but do not become magnetized.

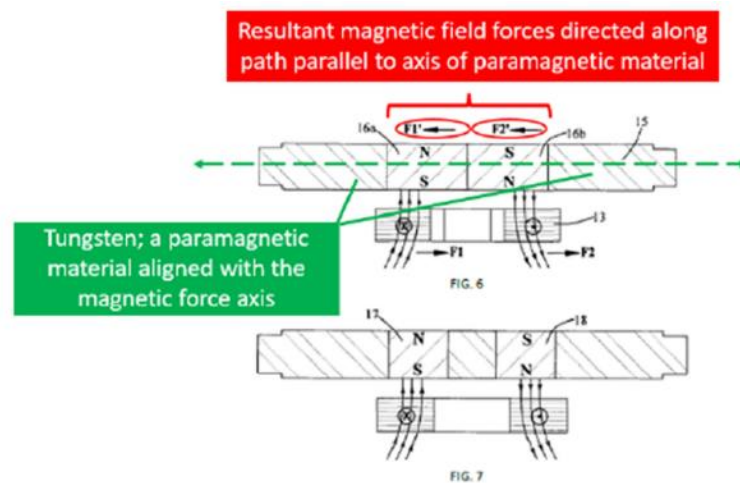
⁵⁷ IPR2023-00992 Petition at 45–56; IPR2023-00993 Petition at 45–56.

139. Wolfe’s suggestion that Ogusu’s mixture of ferromagnetic and non-magnetic materials would form a paramagnetic material is false since the ferromagnetic materials in such a mixture would retain their magnetism upon removal of the magnetic field, conversely to paramagnetic materials which do not. A mixture of ferromagnetic and non-magnetic materials is not a paramagnetic material. It is not correct that having “weak magnetic attraction” itself makes a material paramagnetic. Even under Wolfe’s theory that a mix of ferromagnetic and non-magnetic materials is “similar to a paramagnetic material,” Ogusu does not teach an actual paramagnetic material as required by the patent claims, and Wolf does not even suggest that a POSITA would be motivated to replace Ogusu’s mix of ferromagnetic and non-magnetic materials with a paramagnetic material as claimed.

140. Wolfe’s declaration that Dong’s use of a tungsten counterweight shows claim 14’s limitation is incorrect since while tungsten happens to be paramagnetic (as is aluminum, magnesium, molybdenum, and other elements), Dong does not refer to the reluctance of a magnetic circuit at all, and a POSITA reading Dong, even in conjunction with Ogusu and/or Fukumoto would not be motivated even to consider the reluctance or other magnetic properties of the counterweight. Dong shows, in fact, that the counterweight is not even part of the magnetic circuit. Dong specifically illustrates the magnetic field

lines going through the magnet 16a and 16b, and specifically not going through the counterweight that Wolfe identifies as “paramagnetic.” Wolfe’s assertion that “Dong discloses that the counterweight 15 is made [sic] tungsten and directs current paths to create magnetic forces”⁵⁸ appears to be entirely fabricated, as I can find nowhere in Dong that the counterweight is stated to either direct current paths or create magnetic forces. A POSITA would readily recognize that there are not current paths through the counterweight.

141. Wolfe includes this diagram, apparently to support this assertion:



Id., 10 (annotated).

Wolfe’s apparent assertion is that since the force on the counterweight is sideways in the diagram, that somehow this makes it part of the magnetic circuit. This is spurious. The magnetic field lines, and hence the magnetic circuit, is shown clearly going through the magnets (indicated by N and S). As Dong

⁵⁸ IPR2023-00992, Ex. 1003, ¶ 112; IPR2023-00993, Ex. 1003, ¶ 109.

explains, the magnetic circuit results in sideways forces. Wolfe's statement in the diagram that the "magnetic field forces directed along a path parallel to axis of paramagnetic material" is completely unscientific, since, as explained above, a paramagnetic material would have nothing that could be considered an "axis" until it is placed in a magnetic field, which, in the above diagram, it is not. The sideways forces (acceleration) do not cause the tungsten counterweight's electron spins to align; only a magnetic field can do that. Wolfe's assertion that the sideways force "aligns" anything within the counterweight is ludicrous. It's like me saying I could align electron spins in a material by lifting it against the force of gravity.

142. I find the '081 and '830 patents' inventive concept of using paramagnetic materials to concentrate magnetic field lines and thus reduce reluctance of the magnetic circuit completely novel. Normally, ferromagnetic materials are used for this purpose, like the iron core in a transformer. It appears that the inventor of the '081 and '830 patents recognized that because if ferromagnetic materials were used in this way, their persistent magnetism would negatively affect the performance of the device, use of paramagnetic materials would be favorable. This appears to be a completely novel concept and is not shown by the prior art.

143. Wolfe also states that “a POSITA would have been motivated to use paramagnetic materials [according to Dong and/or Ogusu] because decreasing reluctance would increase efficiency (i.e., greater vibrational force while using less power).”⁵⁹ I disagree. Nothing in Fukumoto, Dong, Ogusu, the education and experience of the POSITA, or common sense supports a connection in the mind of the POSITA between decreased reluctance and increased efficiency. Dr. Wolfe relies entirely on the ’081 and ’830 Patents as motivation for the link between reluctance and efficiency.⁶⁰ This is, in my view, an improper use of hindsight, because Dr. Wolfe is assuming that a POSITA would be familiar with the ’081 and ’830 patents themselves in his obviousness analysis, and would use the patents as a roadmap through the prior art. A POSITA would already need to understand everything about claim 14—the use of paramagnetic materials, the shaping and positioning of those materials, and the reduction of reluctance of magnetic circuits—in order to be motivated as Dr. Wolfe suggests.

144. Wolfe does not state how Ogusu’s ferromagnetic/non-ferromagnetic yoke would be incorporated into Fukumoto’s designs. Ogusu’s yoke forms

⁵⁹ IPR2023-00992, Ex. 1003, ¶ 276; IPR2023-00993, Ex. 1003, ¶ 273.

⁶⁰ IPR2023-00992, Ex. 1003, ¶ 275; IPR2023-00993, Ex. 1003, ¶ 272.

the housing of the device but is itself movable and itself vibrates. In Fukomoto's design the housing is fixed. Thus Ogusu's movable yoke could not be substituted for Fukomoto's fixed housing, with any expectation for the combination working.

145. Wolfe states that Dong's counterweight can be incorporated into Fukumoto's design with "minor changes." However, incorrect incorporation of a paramagnetic mass into Fukumoto's design could in fact increase reluctance. How a paramagnetic mass could be incorporated to reduce reluctance would require a full analysis, which Wolfe does not perform. Furthermore, because neither Fukumoto nor Dong includes any disclosure that the magnetic properties of the counterweight are relevant, a POSITA would have no reason to attend to any consequence of the counterweight on the magnetic field lines. Even assuming a POSITA would be motivated to reduce reluctance, a POSITA would have no expectation that combining Fukumoto with Dong would actually reduce reluctance, because neither Fukumoto nor Dong (unlike the '081 and '830 patents) includes any teaching of *how* to achieve reduced reluctance.

146. Since neither Ogusu or Dong show claim 14's limitation of the use of paramagnetic materials shaped and positioned to reduce reluctance of a magnetic circuit, any hypothetical combination with Fukumoto does not as well.

K. Grounds 1N-O: Each of Fukumoto-Grant or Fukumoto-Barton and Dong-Ogusu claims 14 and 19

147. Section VII.G of each petition mentions grounds 1N and 1O in its title, but each addresses grounds 1N and 1O with just a single sentence, saying claim 14, and claim 19 in the case of the '830 patent, would be obvious over these combinations “for the same reasons” as 1M and citing Dr. Wolfe’s declaration.⁶¹ Nowhere else in Section VII.G of either petition is Grant or Barton mentioned.⁶² Nowhere do the petitions say what would be combined from each of the four references in each combination, and nowhere do the petitions identify a motivation to make these four-reference combinations.

148. To the extent that the Ground 1N combination relies upon the same combination of Fukumoto and Grant as Ground 1B to satisfy claim 1, the Ground 1N combination fails to render elements 1[c] and 1[f], and the corresponding limitations of claim 19, obvious for at least the same reasons as discussed in connection with Ground 1A and Ground 1B above.

149. To the extent that the Ground 1O combination relies upon the same combination of Fukumoto and Barton as Ground 1C to satisfy claim 1, the

⁶¹ IPR2023-00992 Petition at 66–67; IPR2023-00993 Petition at 66–67.

⁶² IPR2023-00992 Petition at 66–70; IPR2023-00993 Petition at 66–70.

Ground 1O combination fails to render elements 1[c] and 1[f], and the corresponding limitations of claim 19, obvious for at least the same reasons as discussed in connection with Ground 1A and Ground 1C above.

150. To the extent that Grounds 1N and 1O rely upon the same combination of Fukumoto and Dong-Ogusu to satisfy the limitations of claims 14 and 19 as Ground 1M, the Ground 1N and Ground 1O combinations fail to render these limitations obvious for at least the same reasons as discussed in connection with Ground 1M above.

L. Ground 1P: Fukumoto and Saiki claims 15 and 20

151. Claim 15 of each patent depends directly on claim 1. Claim 20 contains the same limitations as claim 1, with the addition of the “wherein” limitation. The proposed combination relies on solely on Fukumoto to satisfy claim 1.⁶³ Therefore, the combination fails to render claims 15 and 20 obvious for at least the same reasons that Fukumoto fails to render claim 1 obvious, as discussed for Ground 1A above.

M. Grounds 1Q-R: Each of Fukumoto-Grant or Fukumoto-Barton and Saiki claims 15 and 20

152. Section VII.H of each petition mentions grounds 1Q and 1R in its title, but each addresses grounds 1Q and 1R with just a single sentence, saying

⁶³ IPR2023-00992 Petition at 70–72; IPR2023-00993 Petition at 70–72.

claim 15, and claim 20 in the case of the '830 patent, would be obvious over these combinations “for the same reasons” as 1P and citing Dr. Wolfe’s declaration.⁶⁴ Nowhere else in Section VII.H of either petition is Grant or Barton mentioned.⁶⁵ Nowhere do the petitions say what would be combined from each of the three references in each combination, and nowhere do the petitions identify a motivation to make these three-reference combinations.

153. To the extent that the Ground 1Q combination relies upon the same combination of Fukumoto and Grant as Ground 1B to satisfy claim 1, the Ground 1Q combination fails to render elements 1[c] and 1[f], and the corresponding limitations of claim 20, obvious for at least the same reasons as discussed in connection with Ground 1A and Ground 1B above.

154. To the extent that the Ground 1R combination relies upon the same combination of Fukumoto and Barton as Ground 1C to satisfy claim 1, the Ground 1R combination fails to render elements 1[c] and 1[f], and the corresponding limitations of claim 20, obvious for at least the same reasons as discussed in connection with Ground 1A and Ground 1C above.

155. To the extent that Grounds 1Q and 1R rely upon the same combination of Fukumoto and Saiki to satisfy the limitations of claims 15 and 20 as Ground

⁶⁴ IPR2023-00992 Petition at 64; IPR2023-00993 Petition at 64.

⁶⁵ IPR2023-00992 Petition at 64–66; IPR2023-00993 Petition at 64–66.

1P, the Ground 1Q and Ground 1R combinations fail to render these limitations obvious for at least the same reasons as discussed in connection with Ground 1P above.

N. Ground 1S: Fukumoto and Saiki-Masahiko claim 16

156. Claim 16 of each patent depends on claim 1 via claim 15. The proposed combination relies on solely on Fukumoto to satisfy claim 1.⁶⁶ Therefore, the combination fails to render claim 16 obvious for at least the same reasons that Fukumoto fails to render claim 1 obvious, as discussed for Ground 1A above.

157. Claim 16 requires that the complex modes include, among other modes, “a primary oscillation frequency modulated by a modulating oscillation frequency.” Petitioners and Dr. Wolfe relies only on Saiki for this limitation, stating that “In Saiki’s Figures 17A and 17B, a POSITA would have understood that P1 teaches the ‘primary oscillation frequency,’ and P2 teaches a ‘modulating oscillation frequency.’ In addition, a POSITA would have understood that P1 is modulated by P2 because P1 is in reverse phase with P2.”⁶⁷ I disagree with this analysis.

158. A POSITA reading the specifications of the ’081 and ’830 patents would readily understand that “modulated by” has its plain and ordinary

⁶⁶ IPR2023-00992 Petition at 73–75; IPR2023-00993 Petition at 73–75.

⁶⁷ IPR2023-00992 Petition at 73; IPR2023-00993 Petition at 73; IPR2023-00992, Ex. 1003, ¶ 295 ; IPR2023-00993, Ex. 1003, ¶ 292.

meaning in this context. As a POSITA would understand from their education, modulation refers to mixing or multiplying one signal with another, such as in the familiar amplitude modulation (AM), frequency modulation (FM), phase modulation (PM), and so forth. For example, the Elenga patents teach modulating a 25 Hz primary frequency with a 1Hz modulating frequency to produce “low-frequency pulses of high-frequency vibration.”⁶⁸ A POSITA would recognize that Saiki teaches adding P1 and P2, not modulating P1 with P2 as the ’081 and ’830 patents teach.⁶⁹ These have different effects; notably, modulating P1 with P2 would produce multiple tones which are the sum and difference of the two multiplied signals. Going back to the Elenga patents’ example, adding together a 25Hz and 1Hz frequency would not produce Fig. 22B. Reversing the phase of P1 with respect to P2 has no material effect.

159. Also, the context of the portion of Saiki that Petitioners and Dr. Wolfe relies on shows a completely different purpose for adding frequencies P1-P6. Introducing the example of Figures 17A and 17B, Saiki states that “a more preferable vibration waveform is one with which a large vibration force is maintained over time.”⁷⁰ And after describing the addition of frequencies P1-

⁶⁸ ’082 Patent at 13:23-27 and Fig. 22B; ’830 Patent at 13:41-46 and Fig. 22B.

⁶⁹ IPR2023-00992 Ex. 1013 at 14:47-57; IPR2023-00993 Ex. 1013 at 14:47-57.

⁷⁰ IPR2023-00992 Ex. 1013 at 15:21-23; IPR2023-00993 Ex. 1013 at 15:21-23.

P8, with P2 in reverse phase relative to P1, Saiki observes that “the peak value of the output vibration waveform does not attenuate after the beginning of each period as in FIG. 16B, but a relatively large vibration output is continuously obtained.”⁷¹ This is the opposite of the challenged patents’ teaching that modulating a primary frequency by a modulating oscillating frequency can produce “interesting vibrational modes” such as “low-frequency pulses of high-frequency vibration.”⁷²

160. A POSITA reading Saiki, even in light of Fukumoto and/or Masahiko, would not understand Saiki to teach “a primary frequency modulated by a modulating oscillation frequency” as claimed.

O. Grounds 1T-U: Each of Fukumoto-Grant or Fukumoto-Barton and Saiki-Masahiko claim 16

161. Section VII.I of each petition mentions grounds 1T and 1U in its title, but each addresses grounds 1T and 1U with just a single sentence, saying claim 16 would be obvious over these combinations “for the same reasons” as 1S and citing Dr. Wolfe’s declaration.⁷³ Nowhere else in Section VII.I of either petition is Grant or Barton mentioned.⁷⁴ Nowhere do the petitions say what

⁷¹ IPR2023-00992 Ex. 1013 at 15:33-36; IPR2023-00993 Ex. 1013 at 15:33-36.

⁷² ’082 Patent at 13:14, 13:23-27 and Fig. 22B; ’830 Patent at 13:14, 13:41-46 and Fig. 22B.

⁷³ IPR2023-00992 Petition at 72; IPR2023-00993 Petition at 72.

⁷⁴ IPR2023-00992 Petition at 72–75; IPR2023-00993 Petition at 72–75.

would be combined from each of the four references in each combination, and nowhere do the petitions identify a motivation to make these four-reference combinations.

162. To the extent that the Ground 1T combination relies upon the same combination of Fukumoto and Grant as Ground 1B to satisfy claim 1, the Ground 1T combination fails to render elements 1[c] and 1[f] obvious for at least the same reasons as discussed in connection with Ground 1A and Ground 1B above.

163. To the extent that the Ground 1U combination relies upon the same combination of Fukumoto and Barton as Ground 1C to satisfy claim 1, the Ground 1U combination fails to render elements 1[c] and 1[f] obvious for at least the same reasons as discussed in connection with Ground 1A and Ground 1C above.

164. To the extent that Grounds 1T and 1U rely upon the same combination of Fukumoto and Saiki-Masato to satisfy the limitations of claim 16 as Ground 1S, the Ground 1T and Ground 1U combinations fail to render these limitations obvious for at least the same reasons as discussed in connection with Ground 1S above.

P. Ground 2A: Ogusu and Fukumoto claims 1, 2, 7, 11, 15, 17, and 20

1. Claim 1

165. As discussed above, the term “control component” in claim 1 of each patent, and in claims 19 and 20 of the ’830 patent, is properly construed as a means-plus-function term governed by 35 U.S.C. § 112 ¶ 6. Both Samsung and Resonant Systems agree on this point. They both also agree on the respective corresponding functions for this term in the two patents.⁷⁵

166. As to the corresponding structures, Samsung argues that the corresponding structure requires a processor programmed with an algorithm.⁷⁶ Resonant System argues that the corresponding structures are “oscillator circuit; microcontroller with internal or external memory; processor; CPU; microprocessor.”⁷⁷ For at least the processor, CPU, and microprocessor cases, Resonant System agrees that the structure must include a disclosed algorithm or its equivalent.⁷⁸

167. To the extent that the Board agrees that the corresponding structures include oscillator circuits or microcontrollers and that they do not require any particular algorithm, the asserted prior art fails to disclose such a structure,

⁷⁵ IPR2023-00992 Petition at 7; IPR2023-00993 Petition at 8.

⁷⁶ IPR2023-00992 Petition at 7; IPR2023-00993 Petition at 8.

⁷⁷ Section VIII.C above.

⁷⁸ Section VIII.C above.

and the petitions fail to show that a POSITA would be motivated to use such a structure to perform the required function.

168. Neither Fukumoto nor the petitions mention a microcontroller. Dr. Wolfe’s declarations mention microcontrollers solely in his section on the background of the technology, without suggesting any particular relevance to the prior art or invalidity grounds.⁷⁹

169. Fukumoto does not mention an oscillator circuit. The petitions only mention oscillator circuits as structures that purportedly would have been equivalent to the H-bridge switch required as a part of the corresponding structure for “control component” under Samsung’s construction.⁸⁰ Samsung does not present any evidence that any prior art oscillator circuit alone could perform the claimed function for the “control component.” None of the oscillators or related circuit discussed by Dr. Wolfe would perform the full function of “controlling supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude specified by one or more stored values.”⁸¹ Samsung had every opportunity to argue that some form of oscillator circuit taught or rendered

⁷⁹ IPR2023-00992, Ex. 1003, ¶ 69; IPR2023-00993, Ex. 1003, ¶ 69.

⁸⁰ IPR2023-00992 Petition at 7, 22; IPR2023-00993 Petition at 8, 22.

⁸¹ IPR2023-00992, Ex. 1003, ¶¶ 184–187; IPR2023-00993, Ex. 1003, ¶ 179–182.

obvious by the prior art satisfied the “control component” limitation but chose not to. In particular, claim 2 of each patent provides two alternative ways of satisfying the “control component,” one of which is “an variable oscillator circuit with additional control circuitry.”⁸² But Samsung only argued that the prior art disclosed or made obvious the other alternative way of satisfying the claim 2 “control component.”⁸³

170. For the corresponding structures involving a processor, CPU, or micro-processor, both Resonant Systems and Samsung agree that these structures must include an algorithm and that this algorithm must include at least the step of “provide a corresponding output to the power supply” or “provide a corresponding output to the power supply so that the power supply provides a corresponding output to the driving component.”⁸⁴ In other words, the “power supply” of limitation 1[c] in each patent must be capable of being provided an output, and the “control component” of limitation 1[f] must be capable of providing such an output to the power supply. Samsung’s petition fails to show that this is disclosed or rendered obvious by Ogusu and/or Fukumoto.

⁸² ’081 patent at 15:51–52; ’830 patent at 16:3–4.

⁸³ IPR2023-00992 Petition at 84–87; IPR2023-00993 Petition at 84–87.

⁸⁴ Section VIII.C above.

171. Both the petitions and the Wolfe declarations that they rely upon argue that it is taught or would have been obvious to include a power supply in Fukumoto because Fukumoto teaches that its actuator uses “current” or “power.”⁸⁵ Nowhere in its discussion of limitation 1[c] (or the corresponding limitations in other claims) does Samsung explain what the structure of the power supply would be or address the question of whether it can accept an output from a processor or other component.⁸⁶ In fact, the only example of a specific source of power Samsung suggests would be used in Fukumoto or Ogusu is a “battery.”⁸⁷

172. Fukumoto depends from patent applications filed in 2000 and 2001, and its Figure 3 shows a personal digital assistant or “PDA.”⁸⁸ PDAs of that time indeed used batteries, such as the AAA alkaline batteries shown in the manual for the Palm m100 Handheld⁸⁹:

⁸⁵ IPR2023-00992 Petition at 79–80; IPR2023-00993 Petition at 79–80; IPR2023-00992, Ex. 1003, ¶¶ 311–312; IPR2023-00993, Ex. 1003, ¶ 308.

⁸⁶ See ’081 patent, Fig. 6; ’830 patent, Fig. 6.

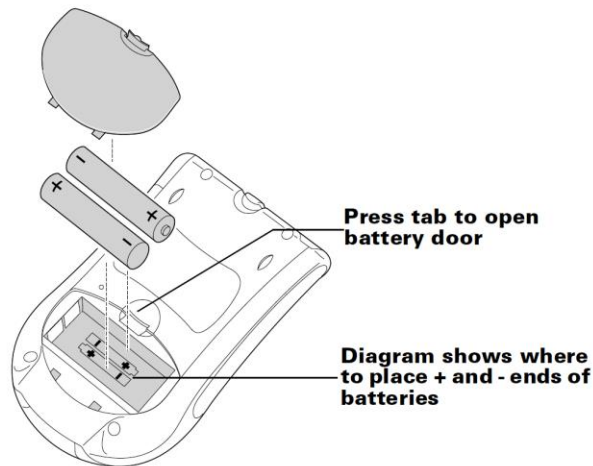
⁸⁷ IPR2023-00992 Petition at 22–23, 84; IPR2023-00993 Petition at 22–23, 84.

⁸⁸ Ex. 1005 at cover, 9:65–67.

⁸⁹ Ex. 2013, “Getting Started with the Palm m100 Handheld,” p. ii, p. 2.

Installing batteries

1. Press the latch on the battery door and lift the battery door away from your handheld.



2. Install two AAA alkaline batteries into the battery compartment.
3. Insert the battery door back into place so that it is flush with the back of your handheld and “clicks” into position.

173. Ogusu is a patent application filed in 1995.⁹⁰ It describes a vibration actuator for use in a pager.⁹¹ Pagers of that time indeed used batteries, such as the AAA alkaline battery shown in the manual for the ULTRA Express FLX⁹²:

⁹⁰ Ex. 1015, cover.

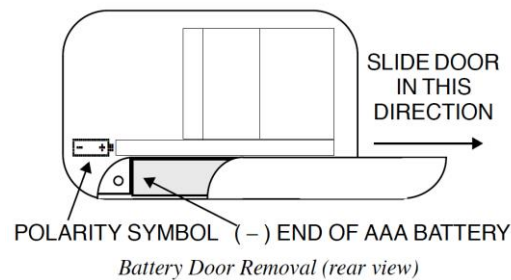
⁹¹ Ex. 1015, ¶ [0003].

⁹² Ex. 2014, “Motorola ULTRA Express FLX, User’s Guide,” p. 11, p. 14.

BATTERY INFORMATION

The ULTRA Express FLX pager operates with one AAA-size alkaline battery.

- ❶ To remove the old battery, hold the pager (back side facing up), and press down on the battery door.
- ❷ Slide the door to the side until its locking tabs release. Continue sliding the door until it is free of the housing.
- ❸ To install a new battery, align the battery so the positive (+) and negative (–) markings match the direction of the polarity markings shown on the back cover, and insert the battery.
- ❹ To replace the battery door, align the grooves on the battery door with the grooves on the front and back housing.
- ❺ Slide the battery door until it is fully closed and a “click” is heard. The battery door is self-locking.



174. As is well-known even to people with no technical training, a AAA-size alkaline battery has two terminals, + and –, through which it supplies voltage and current. It has no input to receive an output from a processor. Samsung has not identified any prior art battery that would have been capable of receiving an output from a processor, and has not provided any evidence that a POSITA would have been motivated to use such a battery with Fukumoto or Ogusu, rather than a conventional alkaline battery or other conventional two-terminal battery.

175. Samsung’s discussion of limitation 1[f] fails to show that the “control component” Samsung identifies in Fukumoto would have provided an output to the power supply. Samsung’s evidence for this is the statement in Fukumoto

that “the CPU **113** instructs the drive signal generation circuit **114** to generate a drive signal (step **S103**)” and “the drive signal generation circuit **114** generates a drive signal using the waveform data supplied from the CPU **113**.”⁹³ But nothing in this statement suggests that the instruction from the CPU is provided to the power supply. Nothing that Samsung points to indicates that the battery or other power supply is a part of the drive signal generation circuit, or even if it is, that the power supply would be receiving any output provided by the CPU.

176. In other words, Samsung has failed to show that the prior art teaches—or that a POSITA would have modified the prior art to contain—a power supply that satisfies the requirements of limitations 1[c] and 1[f], under Samsung’s proposed construction of “control component” or under any other construction that requires providing an output to the power supply.

177. Furthermore, Samsung’s proposed construction of “control component” requires an “H Bridge Switch” and providing a “corresponding output to the H-bridge switch.”⁹⁴ I do not believe that it is necessary for the Board to

⁹³ Ex. 1005, Fukumoto at 17:20–26; IPR2023-00992 Petition at 22, 84; IPR2023-00993 Petition at 22, 84; IPR2023-00992, Ex. 1003, ¶ 189; IPR2023-00993, Ex. 1003, ¶ 183.

⁹⁴ IPR2023-00992 Petition at 7; IPR2023-00993 Petition at 8.

determine whether these features are actually required in the “control component,” because Samsung’s failure to show output to the power supply fully resolves the issues. But to the extent that the Board does find that Samsung’s proposed construction is correct, Samsung does not show that a POSITA would have been motivated to include the “provide a corresponding output to the H-bridge switch” step or an equivalent to that step.

178. Samsung appears to argue that the “oscillator circuits” and “inverters” that it contends could have been used in Fukumoto are equivalent to an H-bridge switch, and that for this reason a device utilizing such alternatives to the H-bridge switch would have implemented a step equivalent to the step of providing an output to the H-bridge switch.⁹⁵ But, Samsung’s only support for this is a conclusory opinion from Dr. Wolfe.⁹⁶ The actual examples of oscillator circuits and inverters that Dr. Wolfe describes have no inputs that would permit them to accept any inputs from a processor, let alone inputs equivalent to those a processor would provide to a H-bridge switch.⁹⁷ To the extent that any prior art algorithms or circuits satisfy the third step of the algorithm in

⁹⁵ IPR2023-00992 Petition at 22–23, 84; IPR2023-00993 Petition at 22–23, 84.

⁹⁶ IPR2023-00992, Ex. 1003, ¶¶ 189, 323; IPR2023-00993, Ex. 1003, ¶¶ 183, 323.

⁹⁷ IPR2023-00992, Ex. 1003, ¶ 184, 185, 187; IPR2023-00993, Ex. 1003, ¶ 179, 180, 182.

Samsung’s “control component” construction, Samsung has failed to show that a POSITA would be motivated to use those specific algorithms or circuit in Fukumoto for this further reason has failed to show that Fukumoto discloses or renders obvious the “control component” of claim 1[f] and similar claims.

2. Claims 2, 7, 11, 15, and 20

179. Claim 2, 7, 11, and 15 of each patent depends from claim 1. Claim 20 of the ’830 patent includes each of the limitations of claim 1, with the addition of the “wherein” limitation. Therefore, the combination of Ogusu and Fukumoto fails to render each of these claims obvious for at least the same reasons that it fails to render claim 1 obvious.

3. Claim 17

180. Claim 17 of each patent depends from claim 1. Therefore, the combination of Ogusu and Fukumoto and Barton fails to render claim 17 of each patent obvious for at least the same reasons that it fails to render claim 1 obvious.

Q. Grounds 2B-C: Ogusu and Each of Fukumoto-Grant or Fukumoto-Barton claims 1, 2, 7, 11, 15, 17, and 20

181. Section VII.J of each petition mentions grounds 2B and 2C in its title, but each addresses grounds 2B and 2C with just a single sentence, saying claims 1, 2, 7, 11, 15, 17, and 20 would be obvious over these combinations

“for the same reasons” as 2A and citing Dr. Wolfe’s declaration.⁹⁸ Nowhere else in Section VII.J of either petition is Grant or Barton mentioned.⁹⁹ Nowhere do the petitions say what would be combined from each of the three references in each combination, and nowhere do the petitions identify a motivation to make these three-reference combinations.

182. As discussed above in connection with Grounds 1A, 1B, 1C, and 2A, none of Fukumoto, Fukumoto and Grant, Fukumoto and Barton, Ogusu and Fukumoto renders elements 1[c] or 1[f] (or the corresponding limitations of claim 20) obvious. The petitions do not explain how three references would be combined in Grounds 2B or 2C, however to the extent that these grounds rely on combinations of the kinds described in Grounds 1A, 1B, 1C, and 2A, they fail to render those elements obvious for the same reasons as discussed in connection with Grounds 1A, 1B, 1C, and 2A.

R. Ground 2D: Ogusu-Fukumoto and Ueda claims 3–6

183. Each of claims 3–6 depends directly, or indirectly, on claim 1. The proposed combination relies on solely on Ogusu-Fukumoto to satisfy claim 1.¹⁰⁰ Therefore, the combination fails to render claims 3–6 obvious for at least the

⁹⁸ IPR2023-00992 Petition at 75; IPR2023-00993 Petition at 75.

⁹⁹ IPR2023-00992 Petition at 75–91; IPR2023-00993 Petition at 75–91.

¹⁰⁰ IPR2023-00992 Petition at 91–92; IPR2023-00993 Petition at 92.

same reasons that Ogusu-Fukumoto fails to render claim 1 obvious, as discussed for Ground 2A above.

184. Under Samsung’s proposed construction of “control component” in claim 3 of each patent, the algorithm must perform steps including “(1) convert[ing] the received output signal into an integer, (2) compar[ing] that integer to a specific value.”¹⁰¹ Samsung relies on Ueda to purportedly satisfy these steps for the “control component.”¹⁰² But Ueda never mentions any integer, nor suggests that any of the values relied on by Samsung is an integer. Beyond reciting the steps of Samsung’s proposed construction, Samsung’s petitions and Dr. Wolfe’s declarations never mention integers in the context of Ueda, either, nor do they provide any evidence that a POSITA would be motivated to modify Ueda’s teachings to utilize an integer value.¹⁰³ At least to the extent that the Board adopts Samsung’s proposed construction of “control component” in claims 3 and 4, Samsung has failed to show Fukumoto and/or Ueda render this limitation obvious. Because each of claims 3–6 contains this limitation and/or depends from a claim that does, Samsung has failed to show that the combination of Fukumoto and Ueda renders any of claims 3–6 obvious.

¹⁰¹ IPR2023-00992 Petition at 7–8; IPR2023-00993 Petition at 8.

¹⁰² IPR2023-00992 Petition at 91–92; IPR2023-00993 Petition at 92.

¹⁰³ IPR2023-00992 Petition at 91–92; IPR2023-00993 Petition at 92; IPR2023-00992, Ex. 1003, ¶ 340; IPR2023-00993, Ex. 1003, ¶ 337.

S. Grounds 2E-F: Each of Ogusu-Fukumoto-Grant or Ogusu-Fukumoto-Barton and Ueda claims 3–6

185. Section VII.K of each petition mentions grounds 2E and 2F in its title, but each addresses grounds 2E and 2F with just a single sentence, saying claims 3–6 would be obvious over these combinations “for the same reasons” as 2D and citing Dr. Wolfe’s declaration.¹⁰⁴ Nowhere else in Section VII.K of either petition is Grant or Barton mentioned.¹⁰⁵ Nowhere do the petitions say what would be combined from each of the four references in each combination, and nowhere do the petitions identify a motivation to make these four-reference combinations.

186. To the extent that the Ground 2E combination relies upon the same combination of Ogusu, Fukumoto, and Grant as Ground 2B to satisfy claim 1, the Ground 2E combination fails to render elements 1[c] and 1[f] obvious for at least the same reasons as discussed in connection with Grounds 1A, 1B, 2A, and 2B above.

187. To the extent that the Ground 2F combination relies upon the same combination of Ogusu, Fukumoto, and Barton as Ground 2C to satisfy claim 1, the Ground 2F combination fails to render elements 1[c] and 1[f] obvious for

¹⁰⁴ IPR2023-00992 Petition at 91–92; IPR2023-00993 Petition at 92.

¹⁰⁵ IPR2023-00992 Petition at 91–92; IPR2023-00993 Petition at 92.

at least the same reasons as discussed in connection with 1A, 1C, 2A, and 2C above.

188. To the extent that Grounds 2E and 2F rely upon the same combination of Ogusu-Fukumoto and Ueda to satisfy the limitations of claims 3–6 as Ground 2D, the Ground 2E and Ground 2F combinations fail to render these limitations obvious for at least the same reasons as discussed in connection with Ground 2D above.

T. Ground 2G: Ogusu-Fukumoto and Erixon claims 7-8

189. Each of claims 7 and 8 depends directly on claim 1. The proposed combination relies on solely on Ogusu-Fukumoto to satisfy claim 1.¹⁰⁶ Therefore, the combination fails to render claims 7 and 8 obvious for at least the same reasons that Ogusu-Fukumoto fails to render claim 1 obvious, as discussed for Ground 1A above.

190. The petitions also fail to establish a motivation to combine Fukumoto and Erixon. The argument they make for motivation to combine is based upon replacing Fukumoto’s and/or Ogusu’s vibrating structure with that from Erixon being a “simple substitution.”¹⁰⁷

¹⁰⁶ IPR2023-00992 Petition at 92–93; IPR2023-00993 Petition at 93.

¹⁰⁷ IPR2023-00992 Petition at 59–60, 93; IPR2023-00993 Petition at 59–60, 93.

191. Ogusu teaches that “The vibration of the base part 1 vibrates the entire pager and can transmit the vibration to the user. Furthermore, the vibration is only in a direction perpendicular to the base part 1, which is a direction in which the vibration is easily felt by the user when used in a thin pager. Therefore, use of the vibration is efficient.”¹⁰⁸

192. Moreover, Ogusu teaches away from transmitting vibrations in other directions than perpendicular to the base and toward the human body, saying: “Furthermore, since vibration is generated by rotation, it also includes vibration in directions other than those the user is sensitive to (directions perpendicular to the surface of the human body). Therefore, although the efficiency of converting electricity into rotational motion is high, the effective acting force from among the generated vibration is weak and vibration transmission efficiency is low.”¹⁰⁹

193. Ogusu teaches that its pager “required to be small and thin.”¹¹⁰ In order to fit Erixon’s tube-shaped vibrator into the Ogusu pager without substantially increasing the thickness of the device, the direction of vibration would be oriented parallel to the screen, not perpendicular, resulting in weaker and less efficient vibration:

¹⁰⁸ Ex. 1015, Ogusu at [0034], also [0056].

¹⁰⁹ Ex. 1015, Ogusu at [0008].

¹¹⁰ Ex. 1015, Ogusu at [0009].

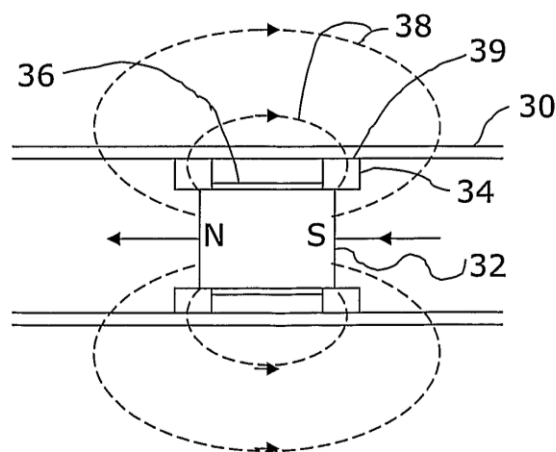


FIG. 3

194. With this design, the vibration will be equally transmitted to the front back and sides of the device. To achieve Ogusu's design goal of transmitting the vibration to the pager base and to the human body would require inventive steps causing most of Erixon's design's vibrations to convey to one side of its housing. Because it produces vibrations in a different direction and transmits them in different directions within the device, Erixon's structure cannot be simply substituted into Ogusu's design, with an expectation of acceptable performance.

195. I note that the '081 and '830 patents performed these inventive steps, to convey vibration to the axial sides of its housing: "FIG. 12 shows yet an alternative LRVM an implementation of the linear-resonant vibration module to which current application is directed. In this alternative implementation, additional coils **1202** and **1204** are incorporated in the moving mass, and

a centering magnet or coil **1206** is positioned in a fixed location on the housing so that, when the direction of the current applied to the coils **1202** and **1204** is alternated, an oscillating rotational force is generated to cause the movable weight to oscillate both in a plane perpendicular to the axis of the chamber as well as linearly oscillating the direction of the chamber.” (’081 patent at 9:28-38). Thus the inventors of the patents contemplated and designed for conveying vibrations to the sides of its design tube. No such inventive steps or motivation to make them are shown in Erixon, and thus no combination of Erixon and Fukumoto could be expected to produce this geometric incorporation.

U. Grounds 2H-I: Each of Ogusu-Fukumoto-Grant or Ogusu-Fukumoto-Barton and Erixon claims 7-8

196. Section VII.L of each petition mentions grounds 2H and 2I in its title, but each addresses grounds 2H and 2I with just a single sentence, saying claims 3–6 would be obvious over these combinations “for the same reasons” as 2D and citing Dr. Wolfe’s declaration.¹¹¹ Nowhere else in Section VII.L of either petition is Grant or Barton mentioned.¹¹² Nowhere do the petitions say

¹¹¹ IPR2023-00992 Petition at 92–93; IPR2023-00993 Petition at 93.

¹¹² IPR2023-00992 Petition at 92–93; IPR2023-00993 Petition at 93.

what would be combined from each of the four references in each combination, and nowhere do the petitions identify a motivation to make these four-reference combinations.

197. To the extent that the Ground 2H combination relies upon the same combination of Ogusu, Fukumoto, and Grant as Ground 2B to satisfy claim 1, the Ground 2H combination fails to render elements 1[c] and 1[f] obvious for at least the same reasons as discussed in connection with Grounds 1A, 1B, 2A, and 2B above.

198. To the extent that the Ground 2I combination relies upon the same combination of Ogusu, Fukumoto, and Barton as Ground 2C to satisfy claim 1, the Ground 2I combination fails to render elements 1[c] and 1[f] obvious for at least the same reasons as discussed in connection with 1A, 1C, 2A, and 2C above.

199. To the extent that Grounds 2H and 2I rely upon the same combination of Ogusu-Fukumoto and Ueda to satisfy the limitations of claims 7 and 8 as Ground 2G, the Ground 2H and Ground 2I combinations fail to render these limitations obvious for at least the same reasons as discussed in connection with Ground 2G above.

X. CONCLUSION

200. In signing this declaration, I understand that the declaration will be filed as evidence in proceedings before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I acknowledge that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

201. I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct and that all statements made herein of my knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001.

Executed on April 12, 2024

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Keith W. Goossen, Ph.D.