

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

RESONANT SYSTEMS, INC.,
Patent Owner.

IPR2023-00992
Patent 9,369,081 B2

Before JAMES J. MAYBERRY, STEVEN M. AMUNDSON, and
MICHAEL T. CYGAN, *Administrative Patent Judges*.

AMUNDSON, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively “Petitioner”) filed a Petition requesting an *inter partes* review of claims 1–9, 11, and 14–17 in U.S. Patent No. 9,369,081 B2 (Ex. 1001, “the ’081 patent”) under 35 U.S.C. §§ 311–319. Paper 3 (“Pet.”). Resonant Systems, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 10 (“Prelim. Resp.”). Further, after receiving Board authorization to address issues concerning discretionary denial, Petitioner filed a Preliminary Reply, and Patent Owner filed a Preliminary Sur-reply. *See* Paper 12; Paper 13 (“Prelim. Reply”); Paper 15 (“Prelim. Sur-reply”).

Under 35 U.S.C. § 314(a) and 37 C.F.R. § 42.4(a), we have authority to determine whether to institute an *inter partes* review. We may institute an *inter partes* review only if “the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a) (2018); *see* 37 C.F.R. § 42.4(a) (2023). The “reasonable likelihood” standard is “a higher standard than mere notice pleading” but “lower than the ‘preponderance’ standard to prevail in a final written decision.” *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 13 (PTAB Dec. 20, 2019) (precedential).

Based on the current record and for the reasons explained below, Petitioner has shown that there is a reasonable likelihood that it would prevail with respect to at least one of the challenged claims. Thus, we institute an *inter partes* review of claims 1–9, 11, and 14–17 in the ’081 patent on all challenges included in the Petition.

II. BACKGROUND

A. Real Parties in Interest

Petitioner identifies the following as the real parties in interest: Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. Pet. 95. Patent Owner identifies itself as the sole real party in interest. Paper 5, 1. The parties do not raise any issue about real parties in interest.

B. Related Matters

Petitioner and Patent Owner identify the following civil actions as related matters involving the '081 patent:

- *Resonant Systems, Inc. v. Samsung Electronics Co., Ltd. et al.*, No. 2:22-cv-00423 (E.D. Tex. filed Oct. 26, 2022) (the “Texas case”); and
- *Resonant Systems, Inc. v. Sony Group Corp. (Japan) et al.*, No. 2:22-cv-00424 (E.D. Tex. filed Oct. 26, 2022).

Pet. 95; Paper 5, 1.

C. The '081 Patent (Exhibit 1001)

The '081 patent, titled “Linear Vibration Modules and Linear-Resonant Vibration Modules,” issued on June 14, 2016, from an application filed on August 26, 2014, as a continuation of an application filed on January 6, 2012. Ex. 1001, codes (22), (45), (54), (63). The 2012 application is a continuation-in-part of an application filed on May 18, 2010. *Id.* at code (63). The 2010 application claims the benefit of priority to a provisional application filed on May 18, 2009. *Id.* at 1:7–11; *see id.* at code (60).

The '081 patent states that the disclosure relates to “vibration-generating devices and, in particular, to vibration modules that can be incorporated into a wide variety of different types of electromechanical

devices and systems to produce vibrations of selected amplitudes and frequencies over a wide range of amplitude/frequency space.” Ex. 1001, 1:15–20; *see id.* at 3:7–21, 4:13–17, code (57). The patent discloses various embodiments of linear vibration modules (LVMs), including various types of linear-resonant vibration modules (LRVMs). *See id.* at 4:13–17, code (57). LRVMs employ feedback control to “maintain the vibrational frequency” at or near the module’s resonant frequency. *Id.* at 3:13–17, code (57). LVMs and LRVMs “are linear in the sense that the vibrational forces are produced by a linear oscillation of a weight or component within the LVM or LRVM” in contrast to the vibrational forces produced by “currently employed unbalanced electric motors.” *Id.* at 4:17–23.

The ’081 patent describes problems with “currently employed unbalanced electric motors” used to produce vibrational forces. *See* Ex. 1001, 2:12–63. As an example, “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.” *Id.* at 2:16–20. As another example, unbalanced electric motors “are relatively inefficient at producing vibrational motion.” *Id.* at 2:32–33. Hence, “many hand-held devices that employ unbalanced electric motors for generating vibrations quickly consume batteries during use.” *Id.* at 2:37–39. As yet another example, “only a very limited portion of the total vibrational force/frequency space is accessible to unbalanced electric motors” because 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.” *Id.* at 2:47–51, 2:59–62.

To overcome problems with “currently employed unbalanced electric motors,” the ’081 patent endeavors to provide “more efficient and capable vibration-generating units for incorporation into many consumer appliances, devices, and systems.” Ex. 1001, 2:64–3:3, 4:23–26; *see id.* at 3:7–21, code (57). Among other things, an “oscillating linear motion” in LVMs and LRVMs “does not produce destructive forces that quickly degrade and wear out an unbalanced electric motor.” *Id.* at 4:26–28. Moreover, LVMs and LRVMs may “produce vibrational amplitude/frequency combinations throughout a large region of amplitude/frequency space.” *Id.* at 3:17–21, code (57); *see id.* at 5:35–42.

The '081 patent's Figure 4A (reproduced below) depicts an embodiment of an LRVM:

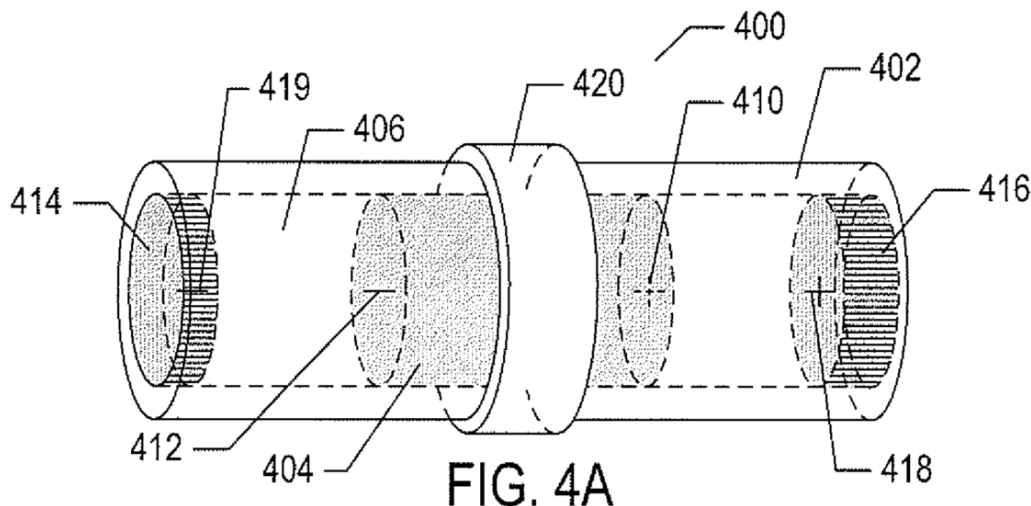


Figure 4A illustrates LRVM 400 including the following components:

- cylindrical housing or tube 402 forming cylindrical chamber 406;
- cylindrical weight (magnet) 404 that moves linearly within cylindrical chamber 406 and has positive polarity 410 (the “+” sign”) on its right end and negative polarity 412 (the “−” sign) on its left end;

- disk-like magnet 414 having negative polarity 419 (the “−” sign) and capping the left end of cylindrical chamber 406;
- disk-like magnet 416 having positive polarity 418 (the “+” sign”) and capping the right end of cylindrical chamber 406; and
- a coil of conductive wire 420 encircling cylindrical housing or tube 402 at “approximately the mid-point of the cylindrical housing.”

See Ex. 1001, 4:44–59, 5:2–4, Fig. 4A.

Disk-like magnets 414 and 416 “are magnetically oriented opposite from the magnetic orientation of” weight (magnet) 404 “so that when the weight moves to either the extreme left or extreme right sides of the cylindrical chamber, the weight is repelled by one of the disk-like magnets at the left or right ends of the cylindrical chamber.” Ex. 1001, 4:59–65. Depending on the direction of an electric current applied to the coil of conductive wire, a magnetic force drives weight (magnet) 404 to the left toward disk-like magnet 414 or to the right toward disk-like magnet 416.

See id. at 5:5–27, Figs. 4B–4G.

By a combination of (1) “a magnetic field with rapidly reversing polarity, generated by alternating the direction of current applied to the coil,” and (2) “the repulsive forces between the weight magnet and the disk-like magnets at each end of the hollow, cylindrical chamber,” the weight magnet “linearly oscillates back and forth within the cylindrical housing 402, imparting a directional force at the ends of the cylindrical chamber with each reversal in direction.” Ex. 1001, 5:27–34.

The '081 patent's Figure 6 (reproduced below) depicts a block diagram of an LRVM having internal components as depicted in Figure 4A and various electrical components:

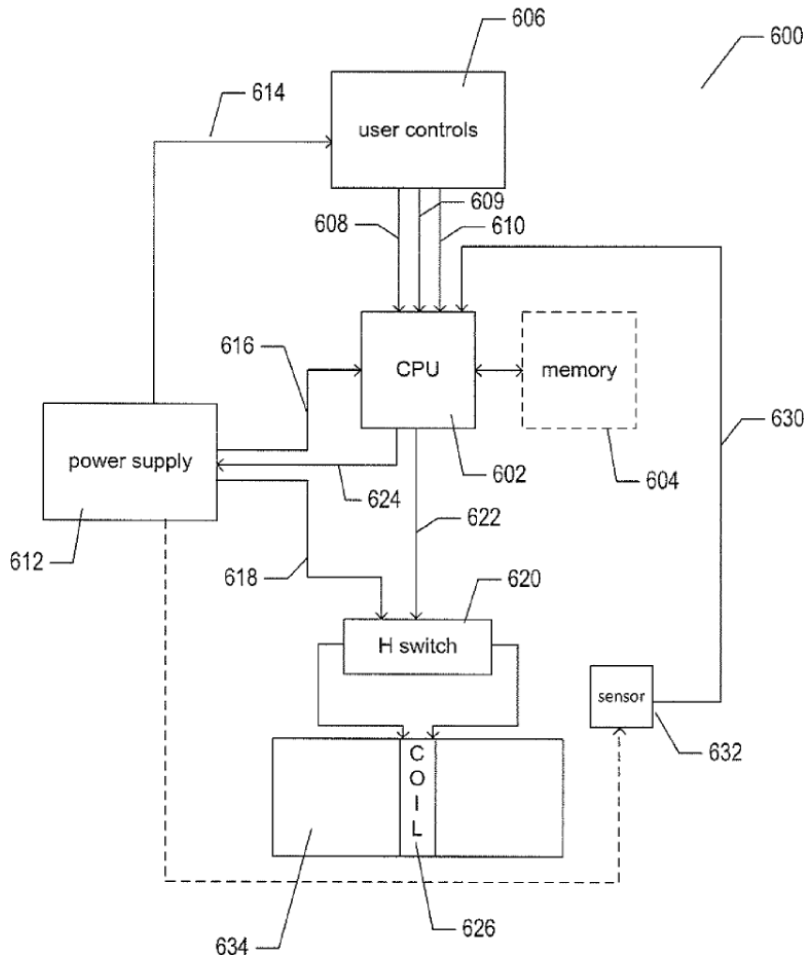


FIG. 6

Figure 6 illustrates LRVM 600 including the following components:

- microprocessor (CPU) 602 executing a control program;
- memory chip 604 storing, among other things, the control program;
- user controls 606 that may include “any of various dials, pushbuttons, switches, or other electromechanical-control devices,” such as “a dial to select a strength of vibration, which corresponds to the current applied to the coil,”

“a switch to select one of various different operational modes,” and “a power button”;

- power supply 612;
- coil 626;
- weight (magnet) 634;
- H-bridge switch 620 that “receives a control-signal input” from microprocessor (CPU) 602 and controls the current supplied to coil 626; and
- “one or more electromechanical sensors 632 that generate a signal corresponding to the strength of vibration currently being produced by the linearly oscillating” weight (magnet) 634, such as “accelerometers, piezoelectric devices, pressure-sensing devices, or other types of sensors that can generate signals corresponding to the strength of desired vibrational force.”

See Ex. 1001, 6:11–42, Fig. 6.

The H-bridge switch “change[s] the direction of current applied to the coil that drives linear oscillation within” the LRVM. Ex. 1001, 5:45–49; *see id.* at 3:36–40, Figs. 5A–5B. The H-bridge switch “is but one example of various different types of electrical and electromechanical switches that can be used to rapidly alternate the direction of current within the coil of an LRVM.” *Id.* at 5:61–65.

D. The Challenged Claims

Petitioner challenges independent apparatus claim 1 and claims 2–9, 11, and 14–17 that depend directly or indirectly from claim 1. Pet. 1, 3–4, 9–93.

Claim 1 exemplifies the challenged claims and reads as follows (with bracketed letters added for reference purposes):¹

1. [pre] A linear vibration module comprising:
 - [a] a housing;
 - [b] a moveable component;
 - [c] a power supply;
 - [d] user-input features;
 - [e] a driving component that drives the moveable component in each of two opposite directions within the housing; and
 - [f] a control component that controls 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 user input received from the user-input features.

Ex. 1001, 15:36–48.

E. The Asserted References

For its challenges, Petitioner relies on the following references:

Name	Reference	Exhibit
Fukumoto	US 7,292,227 B2, issued November 6, 2007 (based on an application filed August 3, 2001)	1005
Grant	US 2006/0284849 A1, published December 21, 2006 (based on an application filed December 8, 2003)	1006
Barton	US 2006/0248183 A1, published November 2, 2006 (based on an application filed April 28, 2005)	1007
Ueda	US 2004/0169480 A1, published September 2, 2004 (based on an application filed July 15, 2003)	1008

¹ We use the same letters that Petitioner uses to identify the claim language. See Pet. vii (Listing of Challenged Claims).

Name	Reference	Exhibit
Erixon	US 2008/0174187 A1, published July 24, 2008 (based on an application filed March 15, 2006)	1009
Fuller	US 2008/0001484 A1, published January 3, 2008 (based on an application filed July 3, 2006)	1010
Dong	CN 101488697A, published July 22, 2009 (based on an application filed February 20, 2009)	1011
Saiki	US 7,006,641 B1, issued February 28, 2006 (based on an application filed April 12, 2000)	1013
Masahiko	US 8,917,486 B2, issued December 23, 2014 (based on an application filed July 26, 2011)	1014
Ogusu	JP H8-196053A, published July 30, 1996 (based on an application filed January 12, 1995)	1015

Pet. 2–4, 9–93.

Petitioner asserts that:

- (1) Dong qualifies as prior art under § 102(a);
- (2) Fukumoto, Grant, Barton, Ueda, Fuller, Saiki, and Ogusu qualify as prior art under § 102(b); and
- (3) Erixon and Masahiko qualify as prior art under § 102(e).

Pet. 2; *see* 35 U.S.C. § 102(a), (b), (e) (2006).²

At this stage of the proceeding, Patent Owner does not dispute that each reference qualifies as prior art. *See, e.g.*, Prelim. Resp. 9–17.

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. § 102 and § 103 effective March 16, 2013. Because the effective filing date of the challenged claims predates the AIA’s amendments to § 102 and § 103, this decision refers to the pre-AIA versions of § 102 and § 103.

F. The Asserted Challenges to Patentability

Petitioner asserts the following challenges to patentability:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–3, 7–9, 15, 17	103(a)	Fukumoto
1–3, 7–9, 15, 17	103(a)	Fukumoto, Grant
1–3, 7–9, 15, 17	103(a)	Fukumoto, Barton
3–6	103(a)	Fukumoto, Ueda
3–6	103(a)	Fukumoto, Grant, Ueda
3–6	103(a)	Fukumoto, Barton, Ueda
7, 8	103(a)	Fukumoto, Erixon
7, 8	103(a)	Fukumoto, Grant, Erixon
7, 8	103(a)	Fukumoto, Barton, Erixon
8	103(a)	Fukumoto, Fuller
8	103(a)	Fukumoto, Grant, Fuller
8	103(a)	Fukumoto, Barton, Fuller
14	103(a)	Fukumoto, Dong, Ogusu
14	103(a)	Fukumoto, Grant, Dong, Ogusu
14	103(a)	Fukumoto, Barton, Dong, Ogusu
15	103(a)	Fukumoto, Saiki
15	103(a)	Fukumoto, Grant, Saiki
15	103(a)	Fukumoto, Barton, Saiki
16	103(a)	Fukumoto, Saiki, Masahiko
16	103(a)	Fukumoto, Grant, Saiki, Masahiko
16	103(a)	Fukumoto, Barton, Saiki, Masahiko
1, 2, 7, 11, 15, 17	103(a)	Ogusu, Fukumoto

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1, 2, 7, 11, 15, 17	103(a)	Ogusu, Fukumoto, Grant
1, 2, 7, 11, 15, 17	103(a)	Ogusu, Fukumoto, Barton
3–6	103(a)	Ogusu, Fukumoto, Ueda
3–6	103(a)	Ogusu, Fukumoto, Grant, Ueda
3–6	103(a)	Ogusu, Fukumoto, Barton, Ueda
7, 8	103(a)	Ogusu, Fukumoto, Erixon
7, 8	103(a)	Ogusu, Fukumoto, Grant, Erixon
7, 8	103(a)	Ogusu, Fukumoto, Barton, Erixon

Pet. 3–4, 9–93.

G. Testimonial Evidence

To support its challenges, Petitioner relies on the declaration of Andrew Wolfe, Ph.D. (Exhibit 1003). Dr. Wolfe states, “I received the Ph.D. degree in Computer Engineering from Carnegie Mellon University” in 1992 and “have taught at some of the world’s leading institutions in the fields of processor technology, computer systems, consumer electronics, software, design tools, data security, cryptography and intellectual property issues.” Ex. 1003 ¶¶ 7–8. Dr. Wolfe also states, “I have been retained” by Petitioner as “an independent expert consultant in this proceeding” and “have been asked to consider whether certain references disclose or suggest the features recited in the claims of” the ’081 patent. *Id.* ¶¶ 1, 4.

At this stage of the proceeding, Patent Owner does not introduce testimonial evidence concerning the patentability issues.

III. DISCRETIONARY DENIAL UNDER § 314(a)

Under § 314(a), the Director possesses “broad discretion” in deciding whether to institute an *inter partes* review. *See* 35 U.S.C. § 314(a); *Saint Regis Mohawk Tribe v. Mylan Pharm. Inc.*, 896 F.3d 1322, 1327 (Fed. Cir. 2018). The Director is “permitted, but never compelled,” to institute an *inter partes* review. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016). The Board decides whether to institute an *inter partes* review on the Director’s behalf. 37 C.F.R. § 42.4(a).

A. Discretionary Denial in View of Parallel Litigation

Patent Owner argues that we should exercise our discretion under § 314(a) to deny institution in view of the Texas case. *See* Prelim. Resp. 17–25; *supra* § II.B. Petitioner argues that we should decline to exercise our discretion under § 314(a) to deny institution. *See* Pet. 93–95. For the reasons explained below, we decline to exercise our discretion under § 314(a) to deny institution in view of the Texas case.

1. NONEXCLUSIVE FACTORS TO CONSIDER

When deciding whether to exercise discretion under § 314(a) to deny institution, the Board has considered the status of litigation involving the parties in light of the AIA’s objective “to provide an effective and efficient alternative to district court litigation.” *NHK Spring Co. v. Intri-Plex Techs., Inc.*, IPR2018-00752, Paper 8 at 12, 19–20 (PTAB Sept. 12, 2018) (precedential). The Board has set forth the following nonexclusive factors to consider when determining whether to exercise discretion under § 314(a) to deny institution due to the advanced state of parallel litigation:

- (1) whether the court granted a stay or evidence exists that one may be granted if the Board institutes a trial;

- (2) the proximity of the court’s trial date to the Board’s projected statutory deadline for a final written decision;
- (3) the investment in the parallel litigation by the court and the parties;
- (4) the overlap in the issues raised by the petition and the issues in the parallel litigation;
- (5) whether the petitioner and the defendant in the parallel litigation are the same party; and
- (6) other circumstances that impact the Board’s exercise of discretion, including the merits.

Apple Inc. v. Fintiv, Inc., IPR2020-00019, Paper 11 at 5–6 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv*”).

These factors “relate to whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in the parallel proceeding.” *Fintiv*, IPR2020-00019, Paper 11 at 6. Further, *Fintiv* instructs that the Board should take “a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review.” *Id.*; see PTAB Consolidated Trial Practice Guide at 55–56, 58 (Nov. 2019) (“CTPG”).³

We also follow the Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (June 21, 2022) (“Interim Procedure”).⁴

³ Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

⁴ Available at https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.

2. ANALYSIS

The Interim Procedure explains that “the PTAB will not discretionarily deny institution in view of parallel district court litigation where a petitioner presents a stipulation not to pursue in a parallel proceeding the same grounds or any grounds that could have reasonably been raised before the PTAB.” Interim Procedure at 3 (citing *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020) (precedential as to § II.A)); *see id.* at 7, 9. The Interim Procedure also explains that such a stipulation (a *Sotera* stipulation) “mitigates concerns of potentially conflicting decisions and duplicative efforts between the district court and the PTAB.” *Id.* at 7.

Petitioner provides a *Sotera* stipulation. Ex. 1044, 1. Specifically, Petitioner stipulates as follows:

Unless the Patent Trial and Appeal Board (“PTAB”) denies or later vacates institution of IPR2023-00992, Samsung Electronics Co., Ltd., and Samsung Electronics, America, Inc. (collectively, “Samsung”) will not pursue, with respect to the ’081 patent in Case No. 2:22-cv-00423-JRG, invalidity of the challenged claims based on the grounds in IPR2023-00992, or based on any other ground that reasonably could have been raised in an IPR.

Id.

Patent Owner does not dispute that Petitioner provides a *Sotera* stipulation. *See, e.g.*, Prelim. Sur-reply 1–4.

Because Petitioner provides a *Sotera* stipulation, we decline to exercise our discretion under § 314(a) to deny institution in view of the Texas case. *See* Interim Procedure at 3, 7, 9.

*B. Discretionary Denial Due to
Voluminous and Excessive Grounds in the Petition*

1. PATENT OWNER’S POSITION

Citing *Adaptics Ltd. v. Perfect Co.*, IPR2018-01596, Paper 20 (PTAB Mar. 6, 2019) (informative), Patent Owner asserts that we should exercise our discretion under § 314(a) to deny institution due to voluminous and excessive grounds in the Petition. *See* Prelim. Resp. 1–2, 9–17; Prelim. Sur-reply 1–4.

In particular, Patent Owner contends that the Petition “identifies 30 total grounds of obviousness” as follows: “21 grounds with Fukumoto as the primary reference” and “9 grounds with Ogusu as the primary reference.” Prelim. Resp. 9–10 (citing Pet. 3–4); *see* Prelim. Sur-reply 2. Patent Owner also contends that 30 grounds are not:

- (1) “explainable as a result of the number of claims that are challenged,” i.e., claims 1–9, 11, and 14–17 (fourteen claims);
- (2) “driven by the number of claims asserted” against Petitioner in the Texas case, i.e., claims 1–8 and 17;
- (3) “driven by a dispute about priority date, because none of the grounds in the Petition is intended to address a different possible priority date for a claim than any of the other grounds”; or
- (4) necessary to address “two different constructions of a disputed claim term.”

Prelim. Resp. 10, 16; Prelim. Sur-reply 4 (citing *Philip Morris Prods. S.A. v. RAI Strategic Holdings, Inc.*, IPR2020-00921, Paper 13 at 40–41 (PTAB Aug. 5, 2021)).

Further, Patent Owner asserts that “30 grounds is in fact an undercount” because (1) the Petition cites “Ogusu alone or in combination

with Fukumoto” as teaching limitation 1[d] in the grounds with Ogusu as the primary reference and (2) Dr. Wolfe cites not only the ten references cited in the Petition but also two additional references for limitations 1[d] and 1[f], i.e., Nagara and Yoon ’554.⁵ Prelim. Resp. 10–11 (citing Pet. 80; Ex. 1003 ¶¶ 171, 177–178); *see* Prelim. Sur-reply 2 n.1. Patent Owner notes that the *Adaptics* petition employed ten references to establish unpatentability. Prelim. Resp. 12 (citing *Adaptics*, IPR2018-01596, Paper 20 at 6). Patent Owner asserts that “the Petition’s grounds are just as excessive and voluminous as grounds found to be improper in *Adaptics*.” *Id.* But Patent Owner acknowledges that the *Adaptics* petition used “and/or” to combine references in some grounds and effectively contained “hundreds” of grounds. Prelim. Sur-reply 1–2 (citing *Adaptics*, IPR2018-01596, Paper 20 at 18–19).

Additionally, Patent Owner contends that the “large number of grounds and very brief discussion devoted to many of them means that the Petition” fails to “identify the grounds and supporting evidence ‘with particularity.’” Prelim. Resp. 13 (citing 35 U.S.C. § 312(a)(3)). Patent Owner also contends that the Petition lacks a sufficient “motivation to combine for many of the asserted grounds.” *Id.* at 14; *see id.* at 14–15.

As an example, Patent Owner asserts that Petitioner cites Ogusu’s coil configuration as teaching limitation 1[e] in the Ogusu-Fukumoto, Ogusu-Fukumoto-Grant, and Ogusu-Fukumoto-Barton combinations but

⁵ *See* U.S. Patent Application Publication 2009/0295739 A1 published on December 3, 2009 (“Nagara”) (Exhibit 1034); and U.S. Patent Application Publication 2008/0153554 A1 published on June 26, 2008 (“Yoon ’554”) (Exhibit 1035).

inconsistently cites the motivation to combine Erixon's coil configuration with Fukumoto when identifying a reason to include Erixon in the Ogusu-Fukumoto, Ogusu-Fukumoto-Grant, and Ogusu-Fukumoto-Barton combinations. Prelim. Resp. 14–15 (citing Pet. 59–60, 81–82, 93). Patent Owner asserts that “substituting Erixon's coil into Fukumoto does not address what motivation there would be to combine Erixon as part of a combination based upon Ogusu.” *Id.* at 15.

2. PETITIONER'S POSITION

Petitioner disputes that the Petition includes voluminous and excessive grounds. *See* Prelim. Reply 1–4. Specifically, Petitioner asserts that each ground in the Petition “clearly states that it is based on a particular reference/combination” and that “the Petition clearly identifies which reference applies to which claim/claim limitation for each ground.” *Id.* at 1. Petitioner asserts that the *Adaptics* petition used “and/or” to combine references in some grounds and effectively contained “hundreds” of grounds, in contrast to the circumstances here. *Id.* Petitioner also asserts that “nothing in *Adaptics* suggests” that using ten references to challenge claims is improper. *Id.* at 4.

Petitioner disagrees with Patent Owner that “30 grounds is in fact an undercount.” Prelim. Reply 3–4; *see* Prelim. Resp. 10. Petitioner asserts that citing disclosures in Ogusu and Fukumoto as teaching the same limitation in the grounds with Ogusu as the primary reference does not increase the number of grounds. *See* Prelim. Reply 2–3 (citing *Protect Animals with Satellites, LLC v. OnPoint Sys., LLC*, IPR2021-01483, Paper 11 at 18–19 (PTAB Mar. 4, 2022)). Petitioner asserts that Dr. Wolfe properly relies on Nagara and Yoon '554 to show an ordinarily skilled

artisan’s knowledge and understanding. *Id.* at 3–4 (citing *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1365 (Fed. Cir. 2015)).

As for Patent Owner’s contentions that the Petition fails to “identify the grounds and supporting evidence ‘with particularity’” and lacks a sufficient “motivation to combine for many of the asserted grounds,” Petitioner asserts that those contentions “are not only wrong, but go to the merits of the Petition without evidentiary support.” Prelim. Reply 4.

3. ANALYSIS

We disagree with Patent Owner that the Petition includes voluminous and excessive grounds due to “a lack of particularity” as in *Adaptics*. See Prelim. Resp. 1–2, 9–17; Prelim. Sur-reply 1–4. Although the Petition includes 30 grounds, each ground adequately maps the challenged claim or claims to the asserted reference or references. See Pet. 9–93. Hence, contrary to Patent Owner’s contention, the Petition does not fail to “identify the grounds and supporting evidence ‘with particularity.’” See Prelim. Resp. 13. And because each ground adequately maps the challenged claim or claims to the asserted reference or references, the concerns in *Adaptics* about failing to specify “the difference(s) between” the claimed invention and the primary references do not exist here. See Pet. 9–93; *Adaptics*, IPR2018-01596, Paper 20 at 19–21.

Patent Owner’s contention that the Petition lacks a sufficient “motivation to combine for many of the asserted grounds” concerns another, different reason for discretionary denial under § 314(a). See Prelim. Resp. 14. The question whether we should discretionarily deny institution because the Petition includes voluminous and excessive grounds differs from the question whether we should discretionarily deny institution because the

Petition includes unmeritorious grounds that predominate over meritorious grounds. *See, e.g., Deeper, UAB v. Vexilar, Inc.*, IPR2018-01310, Paper 7 at 42–43 (PTAB Jan. 24, 2019) (informative); *Adaptics*, IPR2018-01596, Paper 20 at 18–21; CTPG at 64. Patent Owner has not adequately briefed the question whether we should discretionarily deny institution because the Petition includes unmeritorious grounds that predominate over meritorious grounds. *See* Prelim. Resp. 1–2, 9–17; Prelim. Sur-reply 1–4.

Additionally, Petitioner provides a sufficient motivation to combine for the grounds discussed in detail in the patentability analysis below. *See infra* §§ IV.D.3(h), IV.E.3, IV.F.4, IV.G.4, IV.H.1(h). As also explained in the patentability analysis below, Petitioner demonstrates a reasonable likelihood of proving that claims 1–9, 11, and 14–17 are unpatentable under § 103(a) as obvious over various references. *See infra* §§ IV.D.3(i), IV.D.4–IV.D.5, IV.E.4, IV.F.5, IV.G.5, IV.H.1(i), IV.H.2.

Further, as Petitioner asserts, citing disclosures in Ogusu and Fukumoto as teaching the same limitation in the grounds with Ogusu as the primary reference does not increase the number of grounds. *See* Prelim. Reply 3.

Also, Dr. Wolfe properly relies on Nagara and Yoon '554 to show an ordinarily skilled artisan's knowledge and understanding. *See* Ex. 1003 ¶¶ 171, 177–178; *Koninklijke Philips N.V. v. Google LLC*, 948 F.3d 1330, 1337–38 (Fed. Cir. 2020); *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1365 (Fed. Cir. 2015). Dr. Wolfe's reliance on Nagara and Yoon '554 to show an ordinarily skilled artisan's knowledge and understanding does not increase the number of grounds. *See, e.g.,* Ex. 1003 ¶¶ 170–172, 176–191.

The circumstances here differ materially from the circumstances in *Adaptics*. The *Adaptics* petition included a § 102 ground based on Bendel, a § 102 ground based on Sartorius, and the following three § 103 grounds:

- “Williams in view of Bendel, Sartorius, Mettler, Digi-Star, Yuyama, and/or Wright”;
- “Turnage in view of Bendel, Sartorius, Williams, Digi-Star, Yuyama, Mettler, and/or Wright”; and
- “Bendel or Sartorius in view of Williams, Turnage, Abrams, or Bordin, and in further view of each other, Mettler, Digi-Star, Yuyama, and/or Wright.”

Adaptics, IPR2018-01596, Paper 20 at 8–9.

Regarding the third or “catch-all” § 103 ground, the Board observed that the use of “and/or” expanded that ground to “include combinations of three, four, or more references, yielding hundreds of possible combinations.” *Adaptics*, IPR2018-01596, Paper 20 at 19. The Board criticized that ground as “not reasonably bounded in scope and unduly burdensome for both Patent Owner and the Board to address” because that ground required an analysis “whether each and every claim limitation is taught not only by each of Bendel and Sartorius, but by each of these references in combination with one or more of the other references asserted in the proceeding.” *Id.* at 20–21. Here, in contrast to *Adaptics*, the Petition does not include grounds that are unreasonable in scope and unduly burdensome to analyze. *See* Pet. 9–93.

Also, unlike the circumstances here, “declarations in support of” certain references in *Adaptics* included “voluminous additional exhibits containing substantive disclosures relating to the subject matter of the challenged patent claims.” *Adaptics*, IPR2018-01596, Paper 20 at 22.

Regarding the “voluminous additional exhibits,” the Board reasoned as follows:

The extent to which these additional documents may be relied upon to fill gaps in the asserted references with respect to the claimed subject matter increases our concern that the Petition lacks the required particularity, and, instead, turns the Petition into an empty invitation for the Board and Patent Owner to search the record for evidence that might support the full breadth of Petitioner’s contentions.

Id. at 22–23.

The Board identified another deficiency in the *Adaptics* petition, i.e., that it provided “virtually no analysis of how or why” certain references were “publicly accessible” and, therefore, prior-art printed publications. *Adaptics*, IPR2018-01596, Paper 20 at 23–24. Here, the Petition does not raise similar issues.

For the reasons discussed above, we decline to exercise our discretion under § 314(a) to deny institution due to voluminous and excessive grounds in the Petition.

IV. PATENTABILITY ANALYSIS

A. Legal Principles: Obviousness

A patent may not be obtained “if the differences between the subject matter sought to be patented 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 having ordinary skill in the art to which said subject matter pertains.” 35 U.S.C. § 103(a) (2006). An obviousness analysis involves underlying factual inquiries including (1) the scope and content of the prior art; (2) differences between the claimed invention and the prior art; (3) the level of ordinary skill in the art; and (4) where in evidence, objective indicia of

nonobviousness, such as commercial success, long-felt but unsolved needs, and failure of others.⁶ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18, 35–36 (1966); *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1047–48 (Fed. Cir. 2016) (en banc). When evaluating a combination of references, an obviousness analysis should address “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

We analyze the obviousness issues according to these principles.

B. Level of Ordinary Skill in the Art

Factors pertinent to determining the level of ordinary skill in the art include (1) the educational level of the inventor; (2) the type of problems encountered in the art; (3) prior-art solutions to those problems; (4) the rapidity with which innovations are made; (5) the sophistication of the technology; and (6) the educational level of workers active in the field. *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–97 (Fed. Cir. 1983). Not all factors may exist in every case, and one or more of these or other factors may predominate in a particular case. *Id.* These factors are not exhaustive, but merely a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007). Moreover, the prior art itself may reflect an appropriate skill level. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

Petitioner asserts that a person of ordinary skill in the art at the time of the alleged invention “would have had a bachelor’s degree in electrical engineering, mechanical engineering, computer science, or a similar field

⁶ The parties do not provide evidence or argument regarding objective indicia of nonobviousness. *See, e.g.*, Pet. 9–93; Prelim. Resp. 1–17.

and two years of experience related to electronic consumer product design.” Pet. 6. Petitioner also asserts that an ordinarily skilled artisan “could have also obtained similar knowledge and experience through other means.” *Id.* Dr. Wolfe’s testimony supports Petitioner’s assertions. *See* Ex. 1003 ¶ 30.

Patent Owner notes that its analysis in the Preliminary Response “has been made under” Petitioner’s description of an ordinarily skilled artisan and “would not change if minor variations were made to it.” Prelim. Resp. 3–4. Patent Owner “reserves the right to disagree with” Petitioner’s description of an ordinarily skilled artisan. *Id.* at 3.

Based on the current record and for purposes of this decision, we accept Petitioner’s description of an ordinarily skilled artisan because it comports with the technology and claims of the ’081 patent as well as the asserted prior art.

C. Claim Construction

We construe claim terms “using the same claim construction standard” that district courts use to construe claim terms in civil actions under 35 U.S.C. § 282(b). *See* 37 C.F.R. § 42.100(b). Under that standard, claim terms “are given their ordinary and customary meaning, which is the meaning the term would have to a person of ordinary skill in the art at the time of the invention.” *Power Integrations, Inc. v. Fairchild Semiconductor Int’l, Inc.*, 904 F.3d 965, 971 (Fed. Cir. 2018) (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc)). The meaning of claim terms may be determined by “look[ing] principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic*

Sofamor Danek, Inc., 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

Petitioner does not propose an explicit construction for any claim term. *See, e.g.*, Pet. 6–93. Petitioner notes that the challenged claims lack the word “means.” *Id.* at 6. Petitioner acknowledges that the absence of the word “means” creates a rebuttable presumption that § 112’s means-plus-function provision does not apply. *Id.* (citing *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015)); *see* 35 U.S.C. § 112 ¶ 6 (2006). But Petitioner contends that the following “component” limitations overcome the rebuttable presumption:

- (1) “a moveable component” (claim 1);
- (2) “a driving component” (claim 1);
- (3) “a control component” (claim 1);
- (4) “the control component receives output signals from sensors within the linear vibration module during operation of the linear vibration module and adjusts one or more operational control outputs of the control component according to the received output signals from the sensors” (claim 3); and
- (5) “the control component adjusts the one or more operational control outputs of the control component according to the received output signals from the sensors in order that subsequent operation of the linear vibration module produces desired outputs from the one or more sensors corresponding to one or more operational control parameters” (claim 4).

Pet. 7–8 (emphases omitted). For each of these limitations, Petitioner identifies corresponding structure described in the ’081 patent’s specification. *Id.* at 7–8 (citing Ex. 1001, 7:10–24, 7:32–8:20, Figs. 4A–4G, 7A, 7C, 6, 13).

Additionally, claim 4 depends directly from claim 1, and Petitioner asserts that claim 1 lacks an antecedent basis for the following terms in claim 4: “the one or more operational control outputs of the control component,” “the sensors,” and “the one or more sensors.” Pet. 8, 51; *see* Ex. 1001, 15:36–48 (claim 1), 16:1–7 (claim 4). To address the antecedent-basis issues in claim 4, Petitioner proposes two alternative interpretations for claim 4. Pet. 8, 51. First, Petitioner proposes eliminating the word “the” in the following terms in claim 4: “the one or more operational control outputs of the control component” and “the sensors.” *Id.* Thus, Petitioner proposes interpreting “the one or more operational control outputs of the control component” as “one or more operational control outputs of the control component” and interpreting “the sensors” as “sensors.” *Id.* Second, Petitioner proposes interpreting claim 4 as depending for claim 3 instead of claim 1. *Id.*

But Petitioner asserts that “the Board need not resolve the correct interpretation” of claim 4 because claim 4 is “unpatentable under either possibility.” Pet. 8–9 (citing *Realtime Data v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019)); *see id.* at 51.

Patent Owner does not propose an explicit construction for any claim term. *See, e.g.*, Prelim. Resp. 4, 9–17. Patent Owner contends that “there is no need for the Board” to either (1) decide whether the “component” limitations invoke § 112’s means-plus-function provision or (2) interpret claim 4. *Id.* at 4.

“[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.” *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999); *see Nidec Motor*

Corp. v. Zhongshan Broad Ocean Motor Co., 868 F.3d 1013, 1017 (Fed. Cir. 2017). Based on the current record, we determine that no claim term requires an explicit construction to decide whether Petitioner satisfies the “reasonable likelihood” standard for instituting trial. Nor is there a need at this stage of the proceeding to (1) decide whether the “component” limitations invoke § 112’s means-plus-function provision or (2) interpret claim 4.

For the grounds discussed in detail in the patentability analysis below, Petitioner establishes sufficiently that the references teach the “component” limitations if § 112’s means-plus-function provision does not apply to those limitations, and at this stage of the proceeding, Patent Owner makes no arguments to the contrary. *See, e.g., infra* §§ IV.D.3(c), IV.D.3(f)–(g), IV.E.2(a), IV.H.1(c), IV.H.1(f)–(g). Whether § 112’s means-plus-function provision applies to those limitations is better resolved at trial on a more developed record. For the grounds discussed in detail in the patentability analysis below, Petitioner establishes sufficiently that the references teach claim 4’s limitations under each of Petitioner’s two alternative interpretations for claim 4, and at this stage of the proceeding, Patent Owner makes no arguments to the contrary. *See infra* § IV.E.2(a).

*D. Alleged Obviousness over Fukumoto Alone
or Fukumoto and Barton: Claims 1–3, 7–9, 15, and 17*

Petitioner contends that claims 1–3, 7–9, 15, and 17 are unpatentable under § 103(a) as obvious over Fukumoto alone or Fukumoto and Barton. *See* Pet. 9–35, 39–44. Below, we provide overviews of Fukumoto and Barton. Then, we consider obviousness issues. As explained below, Petitioner establishes sufficiently for purposes of institution that:

- (1) Fukumoto alone teaches the subject matter in claims 1–3, 7–9, 15, and 17; and
- (2) the combined disclosures in Fukumoto and Barton teach the subject matter in claims 1–3, 7–9, 15, and 17.

1. OVERVIEW OF FUKUMOTO (EXHIBIT 1005)

Fukumoto is a U.S. patent titled “Electronic Device, Vibration Generator, Vibration-Type Reporting Method, and Report Control Method,” filed on August 3, 2001, and issued on November 6, 2007. Ex. 1005, codes (12), (22), (45), (54). Fukumoto states that the invention “relates to a user interface and vibration generation mechanism of an electronic device.” *Id.* at 1:8–9; *see id.* at code (57). As examples of electronic devices, Fukumoto identifies the following:

- “PDAs (personal digital assistants), personal computers, [and] ATMs (automatic teller machines)”;
- “a mobile phone, electronic notebook, mobile computer, wristwatch, electronic calculator, remote controller of an electronic device, and other various types of portable electronic devices”; and
- “a stationary type computer or a vending machine, cash register, car navigation system, household electric appliance, or other of various types of electronic devices not having portability.”

Id. at 1:13–14, 32:52–53, 50:50–59.

Fukumoto endeavors to provide “an electronic device, a vibration generator, a vibration-type reporting method, and a report control method enabling a user to easily confirm without viewing a screen receipt of an input operation or a response of the electronic device with respect to an operation input.” Ex. 1005, 1:45–50. To achieve those objectives, Fukumoto employs the following:

- “a vibration generator for imparting vibration to a hand-touched portion of the electronic device”; and
- “vibration control means for causing the vibration generator to generate vibration when it is detected that an operation input in the operating unit has been received.”

Id. at 1:51–58. Hence, “the electronic device reports to a user that an operation input has been received, by causing the hand-touched portion of the electronic device to vibrate.” *Id.* at 1:64–67.

Fukumoto’s Figure 1 (reproduced below) depicts an example electronic device, i.e., a PDA:

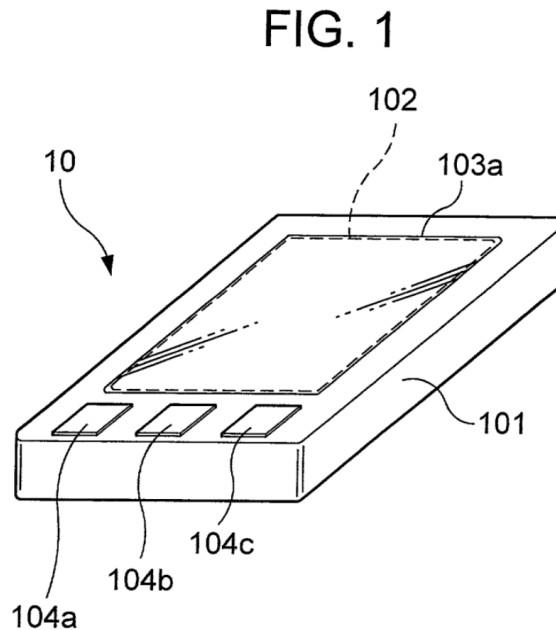


Figure 1 illustrates PDA 10 including main case 101, transparent touch panel 102, display panel 103a covering an opening in main case 101, and push-button type operation keys 104a, 104b, and 104c on the upper surface of main case 101. Ex. 1005, 13:41–51, Fig. 1.

A “user inputs operation instructions to” PDA 10 by (1) “touching the touch panel 102 by his or her fingertip” or (2) “using a pen or other operation tools.” Ex. 1005, 13:45–49. A user may also employ operation

keys 104a, 104b, and 104c “for inputting operation instructions to” PDA 10, such as “for turning the main power on or off.” *Id.* at 13:49–53.

Fukumoto’s Figure 2 (reproduced below) depicts a hardware configuration for PDA 10 in Figure 1:

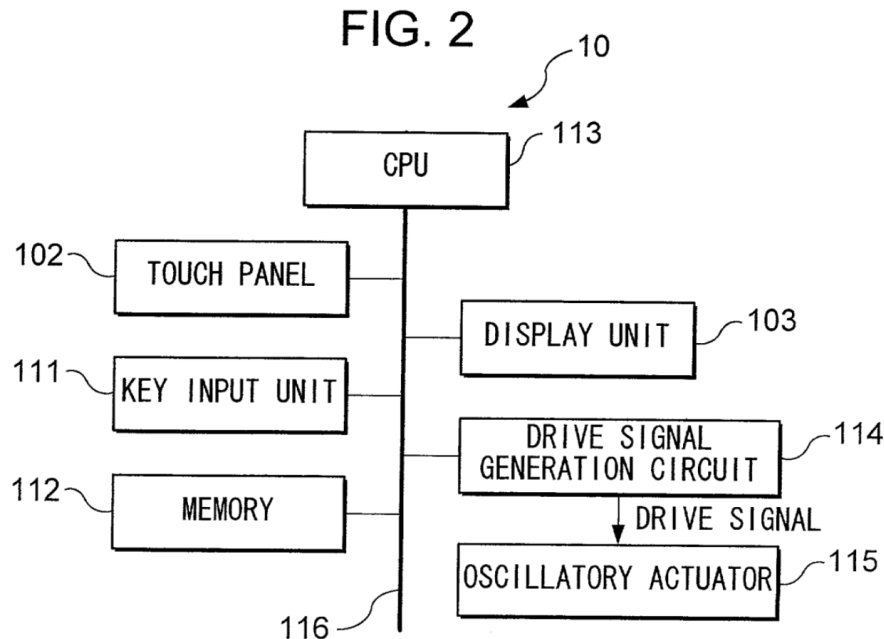


Figure 2 illustrates the following hardware components in PDA 10:

- touch panel 102;
- display unit 103;
- key input unit 111;
- memory 112;
- CPU 113;
- drive-signal-generation circuit 114;
- oscillatory actuator 115; and
- bus 116.

Ex. 1005, 13:54–59, Fig. 2.

In response to a touch operation, touch panel 102 outputs to CPU 113 “a signal showing a touched position on the touch panel 102.” Ex. 1005,

13:60–62. Key input unit 111 outputs to CPU 113 “a key operation signal in response to the pressing operation of the operation keys 104a to 104c by the user.” *Id.* at 13:65–14:1. Memory 112 stores (1) “programs, data, etc. for controlling” PDA 10 and (2) “waveform data of the drive signal for driving” oscillatory actuator 115. *Id.* at 14:1–4.

CPU 113 executes a “vibration control processing” program. Ex. 1005, 14:7–8; *see id.* at 10:4–6, 16:60–19:3, Fig. 5. For instance, when CPU 113 detects “an operation input from the touch panel 102 or any one of operation keys 104a to 104c,” CPU 113 drives oscillatory actuator 115 through drive-signal-generation circuit 114 “to cause the touch panel 102 or one of the operation keys 104a to 104c to vibrate.” *Id.* at 14:8–13. Drive-signal-generation circuit 114 “generates a drive signal for driving” oscillatory actuator 115 according to waveform data supplied by CPU 113 and then applies the drive signal to oscillatory actuator 115 according to instructions from CPU 113. *Id.* at 14:14–19.

Oscillatory actuator 115 “is a linear oscillatory actuator” that (1) “uses a permanent magnet as a movable weight” and (2) “causes the movable weight to linearly reciprocate by electromagnetic force to cause generation of vibration.” Ex. 1005, 14:20–24. Oscillatory actuator 115 “is driven by a drive signal applied from” drive-signal-generation circuit 114. *Id.* at 14:24–26.

Fukumoto's Figure 3 (reproduced below) is a sectional view of oscillatory actuator 115 relative to main case 101 of PDA 10:

FIG. 3

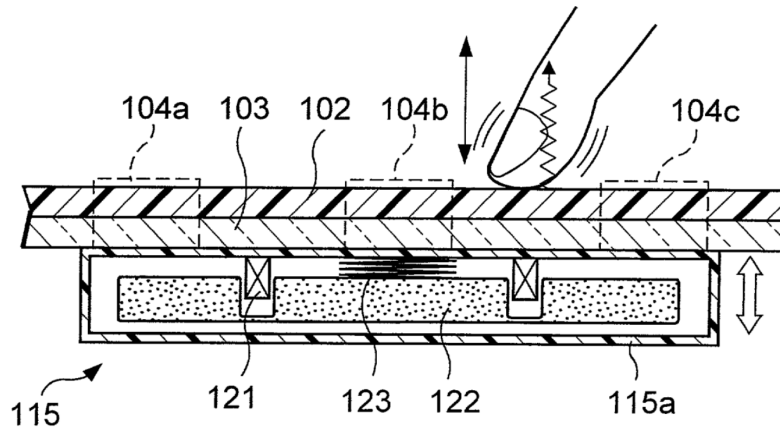


Figure 3 illustrates oscillatory actuator 115 including the following components:

- case 115a contacting display panel 103a (with display panel 103a adjacent to touch panel 102);
- “cylindrical coil 121 fixed to the top surface of the case 115a”;
- “columnar movable weight 122 made of permanent magnet and having an annular space in which the coil 121 fits”; and
- “spring 123 for supporting the movable weight 122.”

Ex. 1005, 14:27–37, Fig. 3.

Spring 123 supports movable weight 122 “in a state where the weight 122 is able to linearly reciprocate in the vertical direction” in Figure 3 “in the space formed inside the case 115a of the oscillatory actuator 115.” Ex. 1005, 14:45–48, Fig. 3. Movable weight 122 “linearly reciprocates in the vertical direction” in Figure 3 “by the magnetic force generated from the coil 121 when an AC (alternating) current (drive signal)

is applied to the coil 121.” *Id.* at 14:57–60. “By the counter force of the reciprocation of the movable weight 122, vibrational acceleration occurs at the portion of the case 115a to which the spring 123 is connected.” *Id.* at 14:60–63.

2. OVERVIEW OF BARTON (EXHIBIT 1007)

Barton is a U.S. patent application publication titled “Programmable Notifications for a Mobile Device,” filed on April 28, 2005, and published on November 2, 2006. Ex. 1007, codes (12), (22), (43), (54). Barton describes problems with notification mechanisms in conventional mobile devices, such as “mobile telephones, smart phones, personal data assistants (PDAs), and the like.” *See id.* ¶¶ 1–2. For instance, “it can be difficult for a user to entertain multiple notifications at one time without” distracting or annoying the user. *Id.* ¶ 2. Also, multiple notifications “within a short period of time can overwhelm a user, making for a less favorable experience when using the mobile device.” *Id.*

To improve “the ability of a mobile device to assist the user in distinguishing between multiple notifications,” Barton discloses embodiments that “allow a user to create one or more separate and independent profiles directed to one or more notification events for a mobile device.” Ex. 1007 ¶ 4; *see id.* ¶ 14. For example, a user can “select sounds, vibrating feedback, haptic feedback and/or combinations thereof, based on the particular notification event,” and “create a custom vibrate and/or haptic pattern.” *Id.* ¶ 5; *see id.* ¶ 14. Hence, a user can “prescribe highly customized alerts, even down to specific vibrate and/or haptic patterns for notification events,” such as an “incoming call, multimedia message service, short message service, instant message, voice message, text message, e-mail

message, meeting reminder, page, message with attachment, message from a particular contact, information associated with a contact, emergency alert, etc.” *Id.* ¶¶ 5, 14; *see id.* ¶ 30.

Barton’s Figure 1 (reproduced below) depicts an example mobile device, e.g., a PDA:

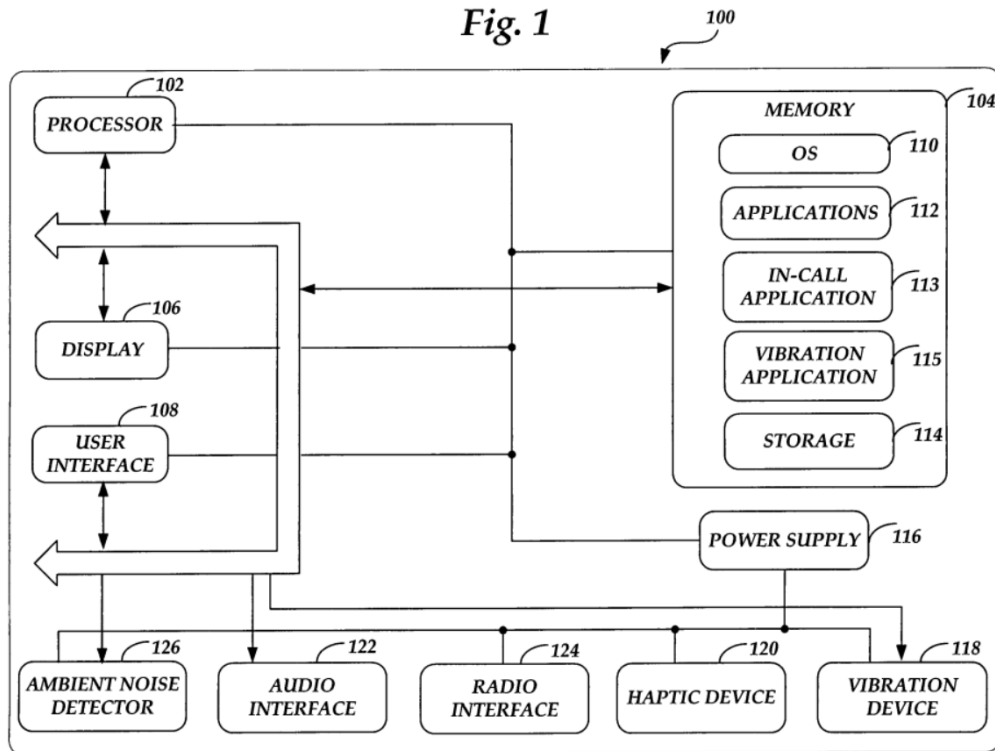


Figure 1 illustrates mobile device 100 including the following components:

- processor 102;
- memory 104 containing operating system (OS) 110 and various applications, e.g., vibration application 115;
- display 106, e.g., “a touch-sensitive display”;
- user interface 108, e.g., “buttons, soft keys, a numeric dialing pad (such as on a typical telephone), or another type of user interface means”;
- power supply 116, e.g., “one or more batteries”;
- vibration device 118 “to give feedback to the user”;

- haptic device 120 “to give feedback to the user”;
- audio interface 122 “to provide audible signals to and receive audible signals from the user”;
- radio interface 124 to perform “the function of receiving and/or transmitting communications at certain frequencies, such as radio frequency (RF)”;
- ambient noise detector 126 “for detecting ambient audio levels, and setting the volume level of the speaker accordingly through the software.”

Ex. 1007 ¶¶ 21–25, Fig. 1.

Mobile device 100 can “control each alert mechanism independently or in various combinations (e.g., audio, vibration, as well as visual cues).”

Ex. 1007 ¶ 24. “Certain alerts may be assigned audio alerts while in a call, while others may be switched to vibrate or turned off in a call.” *Id.* ¶ 30.

Among other things, the user “can choose to not be informed of a received e-mail during a call, but can choose to be informed of another in-coming call, a meeting reminder, etc.” *Id.* ¶ 31. For example, “the user may choose to receive a three short beeps during a call for meeting reminder.” *Id.* ¶ 32.

Barton discloses “an embodiment for creating a vibration pattern using vibration application 115.” Ex. 1007 ¶ 34, Fig. 2B. “Depending on the hardware of the vibration device 118 or haptic device 120, and the abilities of that hardware in the specific device, feedback can be set using a sliding scale of intensities, frequencies, and durations, or set from a predefined list.” *Id.* ¶ 34. For example, “a user may prescribe a long gentle vibrate pulse, followed by two short strong vibration pulses with a short pause between them, and associate the pattern with a particular contact, message type or message type from a particular person, etc.” *Id.*

Using vibration application 115, a user can “select different intensities, frequencies, durations, pitch, etc. from a list of selections, which may be pre-defined.” Ex. 1007 ¶ 38; *see id.* ¶ 39. Alternatively, the user can “use a sliding scale or other means to define various vibrate intensities, frequencies, durations, pitch, etc. by sliding a slider along the scale or inputting numbers which correspond to a particular amount or level.” *Id.* ¶ 38; *see id.* ¶ 39. For instance, “the user could string a short sharp vibrate with two slow, longer vibrations followed by a short slow vibration for a particular notification event, such as an incoming call from a particular contact.” *Id.* ¶ 38.

3. INDEPENDENT CLAIM 1

(a) Preamble 1[pre]

Claim 1 recites “[a] linear vibration module.” Ex. 1001, 15:36.

Petitioner contends that Fukumoto teaches claim 1’s preamble because Fukumoto discloses that “[a]n electronic device drives an oscillatory actuator to cause generation of vibration . . . in a direction perpendicular to their respective front surfaces.” Pet. 12–13 (alterations by Petitioner) (quoting Ex. 1005, code (57)). Further, Petitioner asserts that “Fukumoto’s oscillatory actuator is linear in the same way as the ’081 patent.” *Id.* at 13 (citing Ex. 1001, 3:9–21; Ex. 1005, 14:20–24, Fig. 3).

At this stage of the proceeding, Patent Owner makes no arguments specific to claim 1’s preamble. *See* Prelim. Resp. 1–17. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

Generally, a preamble does not limit a claim. *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1346 (Fed. Cir. 2002). We need not decide whether claim 1's preamble limits the claim because, based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe's testimony, Petitioner establishes sufficiently that Fukumoto teaches claim 1's preamble. *See* Pet. 12–13; Ex. 1003 ¶¶ 161–164.

(b) Limitation 1[a]

Claim 1 recites “a housing.” Ex. 1001, 15:37 (limitation 1[a]).

Petitioner contends that Fukumoto teaches limitation 1[a] because Fukumoto discloses that “the components of the oscillatory actuator are ‘housed inside the case 115a,’” e.g., as depicted in Fukumoto's Figure 3. Pet. 13–14 (quoting Ex. 1005, 15:58–59) (citing Ex. 1003 ¶ 165; Ex. 1005, 15:56–59, Fig. 3). Further, Petitioner asserts that case 115a corresponds to the claimed “housing.” *Id.* at 14. Petitioner also asserts that Fukumoto's PDA 10 includes main case 101 and that main case 101 corresponds to the claimed “housing” according to Patent Owner's infringement contentions. *Id.* (citing Ex. 1022, 2–6).

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 1[a]. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe's testimony, Petitioner establishes sufficiently that Fukumoto teaches limitation 1[a]. *See* Pet. 13–14; Ex. 1003 ¶ 165.

(c) Limitation 1[b]

Claim 1 recites “a moveable component.” Ex. 1001, 15:38 (limitation 1[b]).

Petitioner contends that Fukumoto teaches limitation 1[b] regardless of whether § 112’s means-plus-function provision applies to limitation 1[b]. *See* Pet. 14–15. In particular, Petitioner contends that Fukumoto teaches limitation 1[b] because Fukumoto discloses “a ‘columnar movable weight 122 made of permanent magnet,’” e.g., as depicted in Fukumoto’s Figure 3. *Id.* at 14–15 (quoting Ex. 1005, 14:34–35) (citing Ex. 1005, 14:32–37, Fig. 3). Further, Petitioner asserts that “movable weight 122 linearly reciprocates in the vertical direction” in Figure 3. *Id.* at 15 (quoting Ex. 1005, 14:57–58).

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 1[b]. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe’s testimony, Petitioner establishes sufficiently that Fukumoto teaches limitation 1[b]. *See* Pet. 14–15; Ex. 1003 ¶¶ 166–168.

(d) Limitation 1[c]

Claim 1 recites “a power supply.” Ex. 1001, 15:39 (limitation 1[c]).

Petitioner contends that Fukumoto teaches limitation 1[c] because Fukumoto discloses that “movable weight 122 linearly reciprocates in the vertical direction in the figure by the magnetic force generated from the coil 121 when an AC (alternating) current (drive signal) is applied to the coil 121.” Pet. 15 (quoting Ex. 1005, 14:57–60). Petitioner also contends that Fukumoto discloses operating oscillatory actuator 115 at a resonant frequency with a “small drive power” to reduce power consumption. *Id.* at 15–16 (citing Ex. 1005, 16:44–50). Further, Petitioner asserts that an ordinarily skilled artisan “would have understood and found it obvious that

‘small power’ is supplied to the coil using a power supply.” *Id.* at 16 (citing Ex. 1003 ¶ 169).

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 1[c]. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe’s testimony, Petitioner establishes sufficiently that Fukumoto teaches limitation 1[c]. *See* Pet. 15–16; Ex. 1003 ¶ 169.

(e) Limitation 1[d]

Claim 1 recites “user-input features.” Ex. 1001, 15:40 (limitation 1[d]).

Petitioner contends that Fukumoto teaches limitation 1[d] because Fukumoto’s PDA 10 includes touch panel 102 and operation keys 104a, 104b, and 104c. Pet. 16–17 (citing Ex. 1005, 13:40–14:13, 30:48–53, 31:27–29, Figs. 1–2, 41). Petitioner contends that touch panel 102 and operation keys 104a, 104b, and 104c correspond to the claimed “user-input features.” *Id.* at 17.

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 1[d]. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe’s testimony, Petitioner establishes sufficiently that Fukumoto teaches limitation 1[d]. *See* Pet. 16–17; Ex. 1003 ¶¶ 170–172.

(f) Limitation 1[e]

Claim 1 recites “a driving component that drives the moveable component in each of two opposite directions within the housing.”

Ex. 1001, 15:41–42 (limitation 1[e]).

Petitioner contends that Fukumoto teaches limitation 1[e] regardless of whether § 112’s means-plus-function provision applies to limitation 1[e]. *See* Pet. 17–18. In particular, Petitioner contends that Fukumoto teaches limitation 1[e] because Fukumoto discloses that “movable weight 122 linearly reciprocates in the vertical direction in the figure by the magnetic force generated from the coil 121 when an AC (alternating) current (drive signal) is applied to the coil 121.” *Id.* at 17 (quoting Ex. 1005, 14:57–60) (citing Ex. 1003 ¶¶ 170–172). Petitioner identifies coil 121 as the claimed “driving component.” *Id.* at 18. According to Petitioner, coil 121 “drives the moveable component in each of two opposite directions within the housing.” *Id.*

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 1[e]. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe’s testimony, Petitioner establishes sufficiently that Fukumoto teaches limitation 1[e]. *See* Pet. 17–18; Ex. 1003 ¶¶ 173–175.

(g) Limitation 1[f]

Claim 1 recites “a control component that controls 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 user

input received from the user-input features.” Ex. 1001, 15:44–48 (limitation 1[f]).

(i) Fukumoto

Petitioner contends that Fukumoto teaches limitation 1[f] regardless of whether § 112’s means-plus-function provision applies to limitation 1[f]. *See* Pet. 18–23. Specifically, Petitioner asserts that Fukumoto’s CPU 113 executes a “vibration control processing” program using drive-signal-generation circuit 114 that generates drive signals for driving oscillatory actuator 115 according to waveform data stored in a table. *Id.* at 18–20 (citing Ex. 1005, 13:54–14:26, 16:60–19:3, Figs. 5, 33); *see id.* at 23–24. Petitioner asserts that CPU 113 uses the stored waveform data to generate a drive signal at drive-signal-generation circuit 114 that drives oscillatory actuator 115. *Id.* at 20. Petitioner also asserts CPU 113 and drive-signal-generation circuit 114 correspond to the claimed “control component” that “controls 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 user input received from the user-input features.” *Id.* at 21 (citing Ex. 1003 ¶¶ 177–178).

According to Petitioner, a user’s input produces a CPU-driven sequence of events causing oscillatory actuator 115 to vibrate at a particular amplitude and frequency as follows:

- (1) a user “touches a button or location of the touch panel”;
- (2) the CPU “detects the touch location/button”;
- (3) the CPU “reads the corresponding waveform data”; and
- (4) the CPU “generates a drive signal sent to the oscillatory actuator to vibrate at the amplitude and frequency specified by the waveform.”

Pet. 20–21 (citing Ex. 1003 ¶ 177; Ex. 1005, 13:54–14:25, 29:15–18, 48:42–47).

Second, Petitioner asserts that an ordinarily skilled artisan would have recognized well-known “H-bridge switches, oscillator circuits, and inverters” as mechanisms for converting input power to “the AC drive signal” supplied to coil 121. Pet. 22 (citing Ex. 1003 ¶¶ 180–188; Ex. 1005, 14:57–60).

Third, Petitioner asserts that Fukumoto “discloses or suggests” the following:

- (1) “a processor”;
- (2) “circuitry to convert power supplied from, for example, the battery in the electronic device to the AC drive signal (equivalent to the ’081 patent’s disclosed H-bridge switch)”; and
- (3) “an algorithm to perform the claimed function with at least equivalent steps to those disclosed in the ’081 specification.”

Pet. 23 (citing Ex. 1003 ¶¶ 190–191).

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 1[f]. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe’s testimony, Petitioner establishes sufficiently that Fukumoto teaches limitation 1[f]. *See* Pet. 18–23; Ex. 1003 ¶¶ 176–191.

(ii) Barton

Petitioner contends that the combined disclosures in Fukumoto and Barton teach limitation 1[f] regardless of whether § 112’s means-plus-function provision applies to limitation 1[f]. *See* Pet. 39–43. Specifically,

Petitioner asserts that Barton discloses a mobile electronic device including, among other things, a vibration application stored in a memory, a haptic device, and a vibration device. *Id.* at 39–40 (citing Ex. 1007 ¶¶ 5, 14, 21–24, Fig. 1). Petitioner asserts that a user may customize vibration-type alerts by creating or editing a vibration pattern for the haptic device, the vibration device, or both devices. *Id.* at 40–43 (citing Ex. 1007 ¶¶ 26, 28–34, Figs. 2A–2B). Petitioner also asserts that “feedback can be set using a sliding scale of intensities, frequencies, and durations” when a user creates or edits a vibration pattern. *Id.* at 43 (quoting Ex. 1007 ¶ 34) (citing Ex. 1007 ¶¶ 36, 38).

According to Petitioner, an ordinarily skilled artisan “would have recognized that Barton discloses or suggests a user programming vibration patterns (‘user inputs’) via a user interface (e.g., buttons, soft keys, or a touch-sensitive display) (‘user-input features’) to create a vibration pattern with user-defined vibrate intensity (‘amplitude specified’) and vibration frequency (‘frequency . . . specified’).” Pet. 43 (citing Ex. 1003 ¶ 234).

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 1[f]. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe’s testimony, Petitioner establishes sufficiently that the combined disclosures in Fukumoto and Barton teach limitation 1[f]. *See* Pet. 39–43; Ex. 1003 ¶¶ 231–234.

(h) Alleged Reason to Combine the Teachings of the References

Petitioner asserts that an ordinarily skilled artisan would have been motivated to “use Barton’s user-programmed vibration patterns in Fukumoto’s mobile device to allow for user-driven customization of

vibration effects.” Pet. 44 (citing Ex. 1003 ¶ 229). Petitioner also asserts that an ordinarily skilled artisan would have recognized that the proposed combination would have amounted to “the application of known programming steps and hardware (Barton’s user-input to modify a vibration or haptic pattern) to a known device ready for improvement (Fukumoto’s PDA with user-input features and waveform table) to obtain a predictable result (increased user control of vibrating or haptic feedback for a particular event).” *Id.* (citing Ex. 1003 ¶ 229; Ex. 1005, 4:31–65, 29:45–51; Ex. 1007 ¶¶ 5, 14, 26, 28–39). Dr. Wolfe’s testimony supports Petitioner’s assertions. *See* Ex. 1003 ¶¶ 228–229.

At this stage of the proceeding, Patent Owner makes no arguments against combining Barton’s teachings with Fukumoto’s teachings. *See* Prelim. Resp. 1–17.

Based on the current record, Petitioner establishes sufficiently that an ordinarily skilled artisan would have had a reason to combine Barton’s teachings with Fukumoto’s teachings in the way Petitioner proposes, i.e., to improve “user control” of vibration effects. *See* Pet. 44; Ex. 1003 ¶¶ 228–229. “There is a motivation to combine when a known technique ‘has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way,’ using the ‘prior art elements according to their established functions.’” *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1380–81 (Fed. Cir. 2023) (citations omitted) (quoting *KSR*, 550 U.S. at 417; *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 799–800 (Fed. Cir. 2021)). Moreover, “an implicit motivation to combine” may result from a desire to improve a product by making it “stronger, cheaper, cleaner, faster, lighter, smaller, more durable,

or more efficient.” *DyStar Textilfarben GmbH v. C.H. Patrick Co.*, 464 F.3d 1356, 1368 (Fed. Cir. 2006).

Based on the current record, Petitioner also establishes sufficiently that an ordinarily skilled artisan would have obtained a predictable result when combining Barton’s teachings with Fukumoto’s teachings. *See* Pet. 44; Ex. 1003 ¶ 229.

(i) Preliminary Conclusion About Obviousness/Nonobviousness

As discussed above, Petitioner’s analysis addresses how Fukumoto alone teaches claim 1’s subject matter and how the combined disclosures in Fukumoto and Barton teach claim 1’s subject matter. *See supra* §§ IV.D.3(a)–(g). Additionally, Petitioner provides a reason with rational underpinning as to why an ordinarily skilled artisan would have been motivated to combine Barton’s teachings with Fukumoto’s teachings in the way Petitioner proposes and would have obtained a predictable result. *See supra* § IV.D.3(h). Hence, Petitioner demonstrates a reasonable likelihood of proving that claim 1 is unpatentable under § 103(a) as obvious over Fukumoto alone or Fukumoto and Barton.

4. DEPENDENT CLAIMS 2, 3, 7–9, AND 15

Claims 2, 3, 7–9, and 15 depend directly from claim 1. Ex. 1001, 15:49–67, 16:29–45, 17:9–12.

For claims 2, 3, 7–9, and 15, Petitioner provides an analysis supported by Dr. Wolfe’s testimony about how Fukumoto alone teaches each limitation in each claim. *See* Pet. 23–34, 44; Ex. 1003 ¶¶ 192–215, 235.

At this stage of the proceeding, Patent Owner makes no arguments specific to claims 2, 3, 7–9, and 15. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe’s testimony, Petitioner establishes sufficiently that Fukumoto alone teaches the limitations in claims 2, 3, 7–9, and 15. *See* Pet. 23–34, 44; Ex. 1003 ¶¶ 192–215, 235. Also, as discussed above, Petitioner provides a reason with rational underpinning as to why an ordinarily skilled artisan would have been motivated to combine Barton’s teachings with Fukumoto’s teachings in the way Petitioner proposes and would have obtained a predictable result. *See supra* § IV.D.3(h). Hence, Petitioner demonstrates a reasonable likelihood of proving that claims 2, 3, 7–9, and 15 are unpatentable under § 103(a) as obvious over Fukumoto alone or Fukumoto and Barton. *See supra* § IV.D.3(i).

5. DEPENDENT CLAIM 17

Claim 17 depends directly from claim 1 and specifies that “the control component controls supply of power from the power supply to the driving component to cause the moveable component to oscillate at a frequency and an amplitude that are independently specified by user input received from the user-input features.” Ex. 1001, 17:19–24.

(a) Fukumoto

Petitioner contends that Fukumoto teaches claim 17’s limitations because Fukumoto discloses the following:

- (1) a user “touches a button or location of the touch panel”;
- (2) the CPU “detects the touch location/button”;
- (3) the CPU “reads the corresponding waveform data containing frequency and amplitude attributes from memory”;

- (4) the CPU “generates a drive signal sent to the oscillator actuator to vibrate according to the specified waveform’s amplitude and frequency”; and
- (5) the user “can also change only the amplitude of the drive signal in proportion to the value of the parameter and change the magnitude of the vibration.”

Pet. 34–35 (citing Ex. 1003 ¶ 216; Ex. 1005, 13:54–14:25, 29:9–11, 29:15–18, 31:27–29).

At this stage of the proceeding, Patent Owner makes no arguments specific to claim 17. *See* Prelim. Resp. 1–17.

Based on the current record, and for the reasons explained below, Petitioner establishes sufficiently that Fukumoto teaches claim 17’s limitations. *See* Pet. 34–35; Ex. 1003 ¶¶ 91–92, 176–177, 216–217. Specifically, Fukumoto discloses assigning different frequency-amplitude pairings to different touch buttons and storing each pairing as waveform data in a table. *See, e.g.*, Ex. 1005, 14:2–4, 16:48–50, 28:60–29:44, Fig. 33; *see* Ex. 1003 ¶¶ 91–92. Fukumoto’s Figure 33 (reproduced below) depicts a table for storing waveform data:

FIG. 33

112a

TOUCH BUTTON	AREA DATA	WAVEFORM DATA
A		
B		
C		
⋮	⋮	⋮

Figure 33 illustrates waveform data table 112a that stores “area data showing the area occupied by a touch button on the touch panel 102 using XY

coordinates as well as waveform data of the drive signal to be applied to the oscillatory actuator 115 when that touch button is pressed.” Ex. 1005, 29:1–8, Fig. 33; *see* Ex. 1003 ¶ 92.

Fukumoto explains that when a user presses a touch button, CPU 113 (1) “finds the XY coordinate data of a touched position based on the touch signal,” (2) “refers to the waveform data table 112a,” (3) “identifies the pressed touch button,” (4) “reads from the waveform data table 112a the waveform data of the drive signal linked with the identified touch button,” and (5) “outputs the read waveform data to” drive-signal-generation circuit 114. Ex. 1005, 29:19–29; *see id.* at 17:1–21, Fig. 5; Ex. 1003 ¶¶ 176, 216.

Fukumoto also discloses changing the frequency-amplitude pairing for a particular table entry based on user input, e.g., to “change the mode of vibration for reporting that a touch operation has been received according to the value of the parameter changed” by a user. *See* Ex. 1005, 30:48–31:54, Figs. 41–46. For instance, a user may manipulate a “knob” to adjust the value of a parameter and select one of the following:

- (1) a first frequency-amplitude pairing when the parameter’s value ranges between 0 and 25;
- (2) a second frequency-amplitude pairing when the parameter’s value ranges between 26 and 50;
- (3) a third frequency-amplitude pairing when the parameter’s value ranges between 51 and 75; and
- (4) a fourth frequency-amplitude pairing when the parameter’s value ranges between 76 and 100.

Id. at 30:48–31:11, Figs. 41–42. When changing a frequency-amplitude pairing, a user “can also change only the amplitude of the drive signal in

proportion to the value of the parameter and change the magnitude of the vibration.” *Id.* at 31:27–29.

Selecting a particular frequency-amplitude pairing from a plurality of discrete frequency-amplitude pairings and then “chang[ing] only the amplitude” teaches “independently” specifying “a frequency and an amplitude” according to claim 17. *See* Pet. 34–35; Ex. 1003 ¶¶ 216–217. Claim 17 does not require specifying “a frequency” value or “an amplitude” value from a continuous range of values. *See* Ex. 1001, 17:19–24. Based on the current record, specifying “a frequency” value or “an amplitude” value from a plurality of discrete values suffices for claim 17.

Hence, Petitioner demonstrates a reasonable likelihood of proving that claim 17 is unpatentable under § 103(a) as obvious over Fukumoto.

(b) Barton

Petitioner contends that the combined disclosures in Fukumoto and Barton teach claim 17’s limitations for the reasons that the combined disclosures teach limitation 1[f]. Pet. 45. Further, Petitioner asserts that an ordinarily skilled artisan “would have recognized and found it obvious that Barton’s device enables a user, when programming vibration patterns, to achieve desired patterns by independently varying amplitude (‘vibrate intensities’) and frequency attributes of those patterns (e.g., change one but not the other, lower one and increase the other, etc.).” *Id.* (citing Ex. 1003 ¶ 236).

At this stage of the proceeding, Patent Owner makes no arguments specific to claim 17. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe’s testimony, Petitioner establishes

sufficiently that the combined disclosures in Fukumoto and Barton teach claim 17's limitations. *See* Pet. 39–43, 45; Ex. 1003 ¶¶ 231–234, 236–237. Also, as discussed above, Petitioner provides a reason with rational underpinning as to why an ordinarily skilled artisan would have been motivated to combine Barton's teachings with Fukumoto's teachings in the way Petitioner proposes and would have obtained a predictable result. *See supra* § IV.D.3(h). Hence, Petitioner demonstrates a reasonable likelihood of proving that claim 17 is unpatentable under § 103(a) as obvious over Fukumoto and Barton.

E. Alleged Obviousness over Fukumoto and Ueda: Claims 3–6

Petitioner contends that claims 3–6 are unpatentable under § 103(a) as obvious over Fukumoto and Ueda. *See* Pet. 45–56. Above, we provided an overview of Fukumoto. *See supra* § IV.D.1. Below, we provide an overview of Ueda. Then, we consider obviousness issues. As explained below, Petitioner establishes sufficiently for purposes of institution that the combined disclosures in Fukumoto and Ueda teach the subject matter in claims 3–6.

1. OVERVIEW OF UEDA (EXHIBIT 1008)

Ueda is a U.S. patent application publication titled “Control System for a Linear Vibration Motor,” filed on July 15, 2003, and published on September 2, 2004. Ex. 1008, codes (12), (22), (43), (54). Ueda states that the invention “relates to motor driving apparatuses and, more particularly, to a motor driving apparatus for driving a linear vibration motor having a mover and a spring member for supporting the mover.” *Id.* ¶ 1.

Ueda identifies deficiencies in conventional motor driving apparatuses for linear vibration motors. *See* Ex. 1008 ¶¶ 6–20. For example, “the

maximum output of the linear vibration motor is restricted by the voltage level of the DC voltage applied to the motor driving apparatus.” *Id.* ¶ 17. Ueda endeavors to address those deficiencies by disclosing motor driving apparatuses for linear vibration motors that employ feedback control. *See, e.g., id.* ¶¶ 42–44, 77–80, 90, 97–101, 138–141, 164–165, Figs. 2, 3(a), 4(a).

Ueda’s Figure 4(a) (reproduced below) depicts a motor driving apparatus for a linear vibration motor that employs feedback control:

Fig.4 (a)

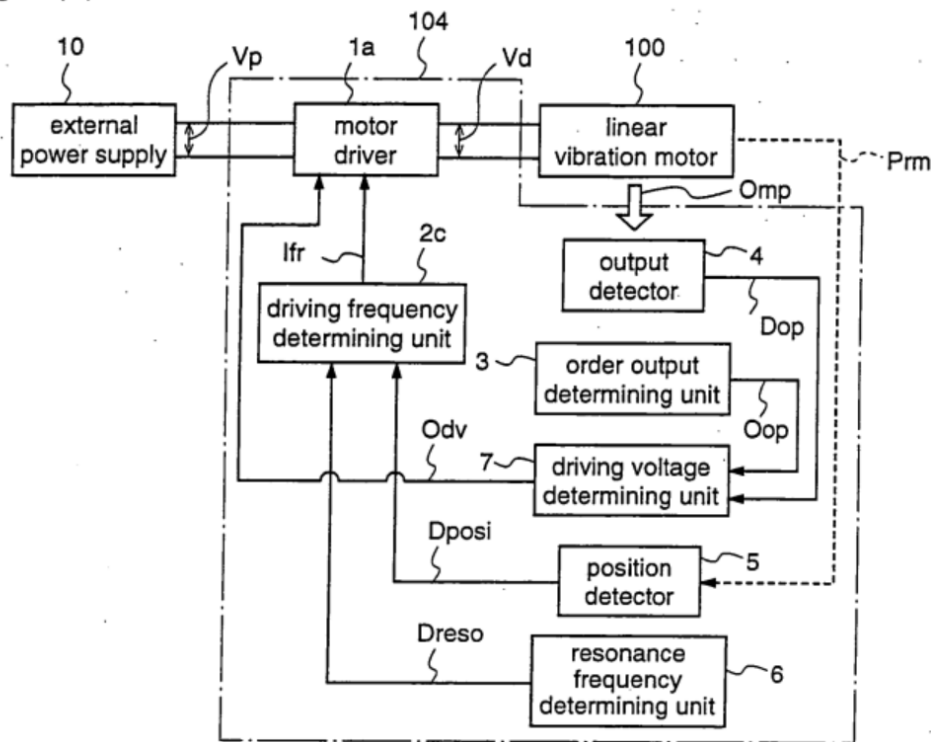


Figure 4(a) illustrates motor driving apparatus 104 receiving a DC voltage V_p from external power supply 10 and providing an AC voltage V_d to linear vibration motor 100. Ex. 1008 ¶¶ 139–140, 146, Fig. 4(a).

As Figure 4(a) shows, motor driving apparatus 104 includes the following components:

- motor driver 1a;
- driving frequency determining unit 2c;

- order output determining unit 3;
- output detector 4;
- position detector 5;
- resonance frequency determining unit 6; and
- driving voltage determining unit 7.

Ex. 1008 ¶¶ 141–143, 146, Fig. 4(a).

Output detector 4 detects “a motor output Omp from the linear vibration motor 100.” Ex. 1008 ¶ 161, Fig. 4(a); *see id.* ¶ 141. Output detector 4 provides “an output detection signal Dop indicating the detected motor output” to driving voltage determining unit 7. *Id.* ¶¶ 141, 161, Fig. 4(a).

Position detector 5 detects “the position of the reciprocating mover of the linear vibration motor 100.” Ex. 1008 ¶ 142, Fig. 4(a). Position detector 5 provides “a position detection signal Dposi indicating the detected mover position” to driving frequency determining unit 2c. *Id.* ¶¶ 142–143, Fig. 4(a).

Order output determining unit 3 determines “a target output as a motor output required of the linear vibration motor 100.” Ex. 1008 ¶ 141. Order output determining unit 3 provides “an output order signal Oop indicating the determined target output” to driving voltage determining unit 7. *Id.* ¶¶ 141, 149, 161, Fig. 4(a).

Resonance frequency determining unit 6 determines “a resonance frequency signal Dreso indicating the resonance frequency of the linear vibration motor 100.” Ex. 1008 ¶ 142. Resonance frequency determining unit 6 provides the resonance frequency signal Dreso to driving frequency determining unit 2c. *Id.* ¶ 143, Fig. 4(a).

Driving frequency determining unit 2c determines “a driving frequency of the linear vibration motor 100” based on the position detection signal Dposi from position detector 5 and the resonance frequency signal Dreso from resonance frequency determining unit 6. Ex. 1008 ¶¶ 143, 159; *see id.* ¶¶ 152–153. Driving frequency determining unit 2c provides “a driving frequency signal Ifr indicating the determined driving frequency” to motor driver 1a. *Id.* ¶¶ 143, 159, Fig. 4(a).

Driving voltage determining unit 7 determines “an amplitude value of an AC voltage to be supplied as a driving voltage to the linear vibration motor 100,” i.e., the amplitude value of the AC voltage Vd provided by motor driver 1a to linear vibration motor 100, based on the output detection signal Dop from output detector 4 and the output order signal Oop from order output determining unit 3. Ex. 1008 ¶¶ 141, 149, 162. Driving voltage determining unit 7 provides “a voltage amplitude signal Odv indicating the determined amplitude value” to motor driver 1a. *Id.* ¶¶ 141, 162, Fig. 4(a).

Motor driver 1a provides the AC voltage Vd having (1) “a frequency equal to the driving frequency determined by the driving frequency determining unit 2c” and (2) “the amplitude value determined by the driving voltage determining unit 7” to linear vibration motor 100 based on “the driving frequency signal Ifr and the voltage amplitude signal Odv.” Ex. 1008 ¶ 146, Fig. 4(a); *see id.* ¶ 163. For example, “the amplitude value of the AC voltage Vd is changed to a larger value when the detected output Dop is smaller than the order output Oop,” and conversely “the amplitude value of the AC voltage Vd is changed to a smaller value when the detected output Dop is larger than the order output Oop.” *Id.* ¶ 162.

2. DIFFERENCES BETWEEN THE CLAIMED
INVENTION AND THE PRIOR ART

(a) Claims 3 and 4

Claims 3 and 4 read as follows:

3. The linear vibration module of claim 1 wherein the control component receives output signals from sensors within the linear vibration module during operation of the linear vibration module and adjusts one or more operational control outputs of the control component according to the received output signals from the sensors.

4. The linear vibration module of claim 1 wherein the control component adjusts the one or more operational control outputs of the control component according to the received output signals from the sensors in order that subsequent operation of the linear vibration module produces desired outputs from the one or more sensors corresponding to one or more operational control parameters.

Ex. 1001, 15:62–16:7.

Petitioner contends that the combined disclosures in Fukumoto and Ueda teach the limitations in claims 3 and 4. *See* Pet. 46–53. Specifically, Petitioner asserts that Ueda “discloses closed-loop feedback control for a linear vibration motor based on the output from multiple sensors.” *Id.* at 46–47 (citing Ex. 1003 ¶ 240). Petitioner asserts that Ueda’s motor driving apparatus 104 includes the following components for controlling linear vibration motor 100:

- (1) “output detector 4 for detecting the motor output generated by the linear vibration motor 100” and “outputting an output detection signal Dop indicating the detected motor output”;
- (2) “position detector 5 for detecting the position of the reciprocating mover of the linear vibration motor 100”

and “outputting a position detection signal Dposi indicating the detected mover position”;

- (3) order output determining unit 3 outputting an output order signal Oop;
- (4) resonance frequency determining unit 6 outputting a resonance frequency signal Dreso;
- (5) driving frequency determining unit 2c that determines “a driving frequency of the linear vibration motor 100” based on the position detection signal Dposi from position detector 5 and the resonance frequency signal Dreso from resonance frequency determining unit 6;
- (6) driving voltage determining unit 7 that determines “an amplitude value of the driving voltage of the linear vibration motor 100” based on the output detection signal Dop from output detector 4 and the output order signal Oop from order output determining unit 3; and
- (7) motor driver 1a that receives a driving frequency signal Ifr from driving frequency determining unit 2c and a voltage amplitude signal Odv from driving voltage determining unit 7 as the claimed “operational control outputs.”

Id. at 47–49, 51–52 (citing Ex. 1003 ¶ 240; Ex. 1008 ¶¶ 140–143, 149, 156–162, 169–175, Fig. 4(a)).

Additionally, Petitioner contends that based on a comparison of the output detection signal Dop and the output order signal Oop by driving voltage determining unit 7, the amplitude value of the AC voltage Vd “is changed to a larger value when the detected output Dop is smaller than the order output Oop,” and conversely “the amplitude value of the AC voltage Vd is changed to a smaller value when the detected output Dop is larger than the order output Oop.” Pet. 47 (quoting Ex. 1008 ¶ 162) (citing Ex. 1003 ¶ 240). Petitioner also contends that:

- (1) when “the position detection signal Dposi indicates ‘the detected position does not exceed a predetermined reference position, the driving frequency of the linear vibration motor 100 is set at the resonance frequency’”; and
- (2) when “the position detection signal Dposi exceeds the reference position ‘the driving frequency of the linear vibration motor 100 is set at a frequency higher than the resonance frequency.’”

Id. at 49 (quoting Ex. 1008 ¶ 160) (citing Ex. 1003 ¶ 241).

Further, Petitioner asserts that Ueda teaches adjusting “one or more operational control outputs of the control component according to the received output signals from the sensors” according to claims 3 and 4 because Ueda discloses “adjusting amplitude based on Dop and adjusting frequency based on Dposi.” Pet. 49–50 (citing Ex. 1003 ¶ 242); *see id.* at 51–53.

At this stage of the proceeding, Patent Owner makes no arguments specific to claims 3 and 4. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe’s testimony, Petitioner establishes sufficiently that the combined disclosures in Fukumoto and Ueda teach the limitations in claims 3 and 4. *See* Pet. 46–53; Ex. 1003 ¶¶ 239–244, 248–249.

(b) Claims 5 and 6

Claims 5 and 6 read as follows (with bracketed letters added for reference purposes):⁷

⁷ We use the same letters that Petitioner uses to identify the claim language. *See* Pet. viii (Listing of Challenged Claims).

5. The linear vibration module of claim 4

[a] wherein the one or more operational control parameters is a strength of vibration produced by the linear oscillation of the moveable component; and

[b] wherein the one or more operational control outputs is a frequency at which the control component drives the moveable component to linearly oscillate, the control component dynamically adjusting the power supplied to the driving component to produce linear oscillation of the movable component at a resonant frequency for the linear vibration module.

6. The linear vibration module of claim 4

[a] wherein the one or more operational control parameters include both a strength of vibration produced by the linear oscillation of the moveable component and a current operational mode; and

[b] wherein the one or more operational control outputs is a control output that determines a current supplied by the power supply to the driving component and a frequency at which the control component drives the moveable component to linearly oscillate.

Ex. 1001, 16:8–28.

For the “strength of vibration” operational control parameter required by limitations 5[a] and 6[a], Petitioner identifies the output order signal Oop produced by Ueda’s order output determining unit 3. Pet. 53, 55 (citing Ex. 1003 ¶ 251). For the “current operational mode” operational control parameter required by limitation 6[a], Petitioner identifies a user-selectable “pattern of vibrations” produced by Ueda’s linear vibration motor. *Id.* at 55 (citing Ex. 1003 ¶ 254; Ex. 1008 ¶¶ 345–346).

For the “frequency” operational control output required by limitations 5[b] and 6[b], Petitioner identifies the driving frequency signal

If produced by Ueda's driving frequency determining unit 2c. Pet. 54–55. Further, Petitioner asserts that an ordinarily skilled artisan would have understood that “the detected position of the mover (Dposi) is compared to an expected position based on the resonant frequency signal (Dreso)” and “then the driving frequency is dynamically adjusted to match the resonant frequency by adjusting the power to the motor.” *Id.* at 54 (citing Ex. 1003 ¶ 252; Ex. 1008 ¶¶ 152–153).

For the “current” operational control output required by limitation 6[b], Petitioner identifies the voltage amplitude signal Odv produced by Ueda's driving voltage determining unit 7. Pet. 55. Further, Petitioner asserts that “resonance frequency determining unit 6 and driving voltage determining unit 7 adjust the AC current supplied to linear vibration motor 100 by adjusting the phase, frequency, and amplitude of the AC current.” *Id.* (citing Ex. 1003 ¶ 255).

At this stage of the proceeding, Patent Owner makes no arguments specific to claims 5 and 6. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe's testimony, Petitioner establishes sufficiently that Ueda teaches the limitations in claims 5 and 6. *See* Pet. 53–56; Ex. 1003 ¶¶ 251–252, 254–255.

3. ALLEGED REASON TO COMBINE THE TEACHINGS OF THE REFERENCES

Petitioner asserts that an ordinarily skilled artisan would have been motivated to “use additional sensors such as Ueda's output and position detection sensors in Fukumoto to provide enhanced feedback control to Fukumoto's linear oscillatory actuator” because doing so “would result in

Fukumoto’s mobile device more reliably delivering vibrations at the desired frequency and amplitude.” Pet. 46 (citing Ex. 1003 ¶ 238; Ex. 1008 ¶¶ 165–166, 347); *see id.* at 50–51. Petitioner also asserts that an ordinarily skilled artisan would have recognized that the proposed combination would have amounted to “no more than applying a known technique (Ueda’s feedback control) to a known device ready for improvement (Fukumoto’s mobile device including its linear oscillatory actuator) to yield predictable results (a linear oscillatory actuator using feedback control to achieve the desired vibration output).” *Id.* at 46 (citing Ex. 1003 ¶ 238). Dr. Wolfe’s testimony supports Petitioner’s assertions. *See* Ex. 1003 ¶¶ 238, 243, 246, 253, 256.

At this stage of the proceeding, Patent Owner makes no arguments against combining Ueda’s teachings with Fukumoto’s teachings. *See* Prelim. Resp. 1–17.

Based on the current record, Petitioner establishes sufficiently that an ordinarily skilled artisan would have had a reason to combine Ueda’s teachings with Fukumoto’s teachings in the way Petitioner proposes, i.e., to provide “enhanced feedback control.” *See* Pet. 46; Ex. 1003 ¶¶ 238, 243, 246, 253, 256. Based on the current record, Petitioner also establishes sufficiently that an ordinarily skilled artisan would have obtained a predictable result when combining Ueda’s teachings with Fukumoto’s teachings. *See* Pet. 46; Ex. 1003 ¶ 238.

4. PRELIMINARY CONCLUSION ABOUT OBVIOUSNESS/NONOBVIOUSNESS

As discussed above, Petitioner’s analysis addresses how the combined disclosures in Fukumoto and Ueda teach the subject matter in claims 3–6. *See supra* §§ IV.E.2(a)–(b). Additionally, Petitioner provides a reason with

rational underpinning as to why an ordinarily skilled artisan would have been motivated to combine Ueda’s teachings with Fukumoto’s teachings in the way Petitioner proposes and would have obtained a predictable result. *See supra* § IV.E.3. Hence, Petitioner demonstrates a reasonable likelihood of proving that claims 3–6 are unpatentable under § 103(a) as obvious over Fukumoto and Ueda.

F. Alleged Obviousness over Fukumoto, Dong, and Ogusu: Claim 14

Petitioner contends that claim 14 is unpatentable under § 103(a) as obvious over Fukumoto, Dong, and Ogusu. *See* Pet. 66–70. Above, we provided an overview of Fukumoto. *See supra* § IV.D.1. Below, we provide overviews of Dong and Ogusu. Then, we consider obviousness issues. As explained below, Petitioner establishes sufficiently for purposes of institution that the combined disclosures in Fukumoto, Dong, and Ogusu teach claim 14’s subject matter.

1. OVERVIEW OF DONG (EXHIBIT 1011)

Dong is a Chinese patent application publication titled “Flat Linear Vibration Motor,” filed on February 20, 2009, and published on July 22, 2009. Ex. 1011, codes (12), (22), (43), (54). Dong states that the invention “relates to a vibration motor, and in particular to a flat linear vibration motor used in portable consumer electronic products.” *Id.* at 3.⁸

⁸ For Exhibit 1011 (Dong), we follow Petitioner’s practice and cite to the page numbers that Petitioner applied to the exhibit.

Dong's Figure 2 (reproduced below) is an exploded perspective view of a flat linear vibration motor:

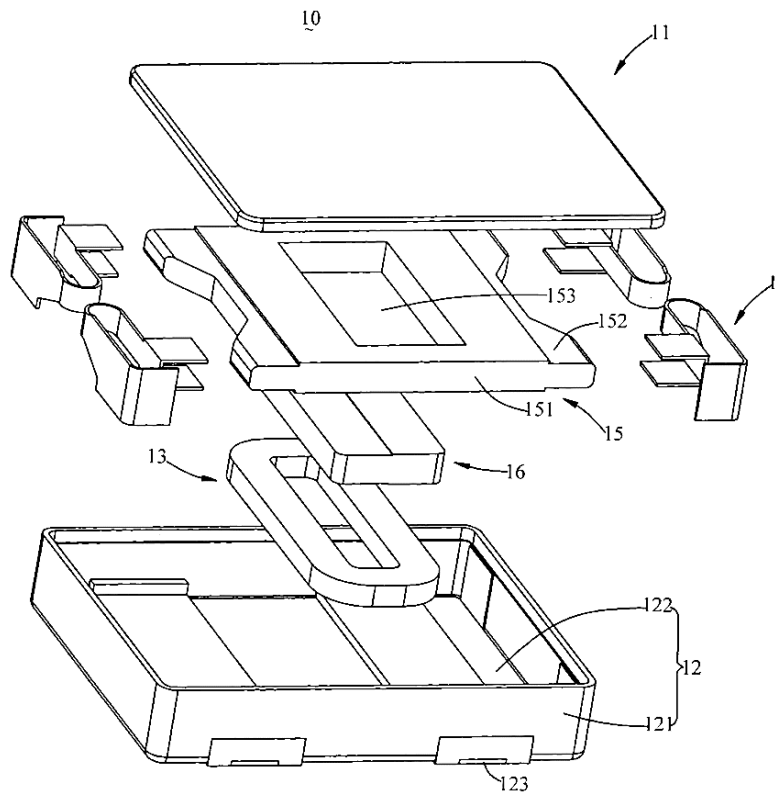


FIG. 2

Figure 2 illustrates flat linear vibration motor 10 including upper cover 11, base 12, coil 13, a plurality of elastic supports 14, counterweight 15, and permanent magnet 16. Ex. 1011, 5, Fig. 2.

To produce vibration, counterweight 15 and permanent magnet 16 move together “under the action of the magnetic field force” when alternating current flows through coil 13. Ex. 1011, 6. Counterweight 15 “functions to strengthen the vibrating force, making the vibration stronger.” *Id.* But counterweight 15 “may be omitted.” *Id.*

Dong explains that when using counterweight 15 “it is preferable to use a material with a density of not less than 7.8 g/cm^3 , such as nickel, tungsten and alloys thereof.” Ex. 1011, 6.

2. OVERVIEW OF OGUSU (EXHIBIT 1015)

Ogusu is a Japanese patent application publication titled “Vibration Actuator,” filed on January 12, 1995, and published on July 30, 1996. Ex. 1015, codes (12), (22), (43), (54). Ogusu states that the invention “relates to a moving magnet-type vibration actuator, and more particularly to a moving magnet-type vibration actuator having low loss and high efficiency.” *Id.* ¶ 1; *see id.* ¶ 47.

Ogusu’s Figure 1 (reproduced below) is a cross-sectional view of a vibration actuator:

[FIG. 1]

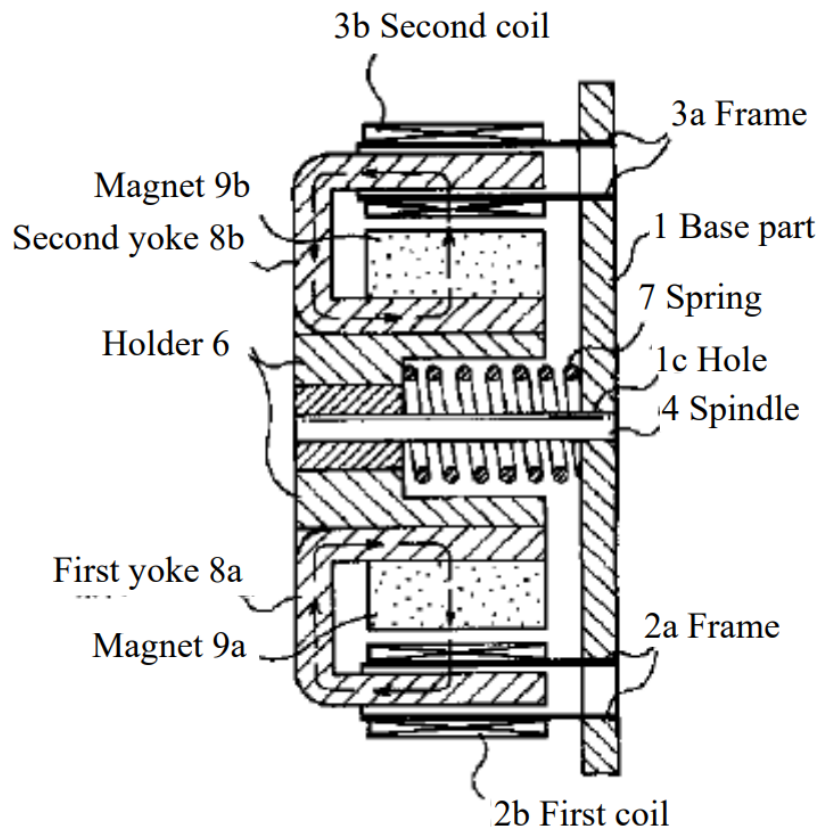


Figure 1 illustrates a vibration actuator including the following components:

- base part 1;

- frame 2a fixed at one end to base part 1;
- first coil 2b wound around frame 2a;
- frame 3a fixed at one end to base part 1;
- second coil 3b wound around frame 3a;
- spindle 4 mounted in hole 1c in base part 1;
- bearing 5 (not labeled in Figure 1) arranged around an end of spindle 4;
- holder 6 connected to bearing 5 and movable with bearing 5 in an axial direction along spindle 4;
- spring 7 to maintain holder 6 in a predetermined position when holder 6 does not vibrate;
- first yoke 8a “composed of a plate-shaped magnetic body” and mounted on holder 6 with one end part forming a core for first coil 2b and the other end part positioned opposite to a side surface of first coil 2b;
- second yoke 8b “composed of a plate-shaped magnetic body” and mounted on holder 6 with one end part forming a core for second coil 3b and the other end part positioned opposite to a side surface of second coil 3b;
- magnet 9a arranged on first yoke 8a opposite to a side surface of first coil 2b; and
- magnet 9b arranged on second yoke 8b opposite to a side surface of second coil 3b.

Ex. 1015 ¶¶ 24–29, Fig. 1. As shown by the broken lines representing magnetic flux in Figure 1, the vibration actuator forms two magnetic circuits as follows: (1) “the magnet opposing the first coil - the first coil - the first yoke” and (2) “the magnet opposing the second coil - the second coil - the second yoke.” *Id.* ¶ 30, Fig. 1; *see id.* ¶ 36.

When an alternating current flows through first coil 2b and second coil 3b, the movable elements (the holder, the bearing, the yokes, and the magnets) “generate vibration according to [the] current waveform.” Ex. 1015 ¶ 32; *see id.* ¶¶ 37–41, 60, Figs. 4(a)–4(e). Because “the movable elements have magnets and a certain amount of weight, the base part 1 side also generates vibration in a direction opposite to that of the movable elements.” *Id.* ¶ 32. The vibration actuator may generate “various sounds and vibrations” by changing the frequency and the amplitude of the alternating current or by “intermittently generating an electric current.” *Id.* ¶ 36; *see id.* ¶¶ 11, 42, 50, 55, 60.

Ogusu explains that “it is also possible to use various non-magnetic materials mixed with ferromagnetic powders as the material” for first yoke 8a and second yoke 8b. Ex. 1015 ¶ 28.

3. DIFFERENCES BETWEEN THE CLAIMED INVENTION AND THE PRIOR ART

Claim 14 depends directly from claim 1 and further requires “flux paths comprising a paramagnetic material that is shaped and positioned to reduce the reluctance of one or more magnetic circuits within the linear vibration module.” Ex. 1001, 17:5–8.

Petitioner contends that the combined disclosures in Fukumoto, Dong, and Ogusu teach claim 14’s limitations. Pet. 68. Specifically, Petitioner asserts that “Dong discloses its counterweight 15 can be composed of tungsten.” *Id.* at 69 (citing Ex. 1011, 6). Petitioner asserts that an ordinarily skilled artisan would have understood that “adding a paramagnetic material such as tungsten to Fukumoto’s vibration module (as taught in Dong) would

reduce the reluctance of the magnetic circuits within Fukumoto’s vibration actuator.” *Id.* (citing Ex. 1003 ¶ 276).

Petitioner asserts that Ogusu further supports this modification by disclosing that “a yoke made of ferromagnetic material or non-ferromagnetic materials mixed with ferromagnetic powders is positioned between the electromagnetic coil and permanent magnet to form a magnetic circuit.” Pet. 69 (citing Ex. 1003 ¶ 279; Ex. 1015 ¶¶ 28–29, 38, Fig. 1). According to Petitioner, using “non-ferromagnetic materials mixed with ferromagnetic powders” in a magnetic circuit would reduce the circuit’s reluctance similar to using paramagnetic materials. *Id.* (citing Ex. 1003 ¶ 279).

At this stage of the proceeding, Patent Owner makes no arguments specific to claim 14. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe’s testimony, Petitioner establishes sufficiently that the combined disclosures in Fukumoto, Dong, and Ogusu teach claim 14’s limitations. *See* Pet. 68–70; Ex. 1003 ¶¶ 276–277, 279.

4. ALLEGED REASON TO COMBINE THE TEACHINGS OF THE REFERENCES

Petitioner asserts that an ordinarily skilled artisan would have been motivated to apply Dong’s teaching to use a tungsten (paramagnetic material) counterweight to Fukumoto’s linear oscillatory actuator for “better efficiency of the magnetic circuit in the vibration module.” Pet. 69 (citing Ex. 1003 ¶ 278). Petitioner also asserts that an ordinarily skilled artisan would have recognized that “non-magnetic materials mixed with ferromagnetic powders, as disclosed in Ogusu, would have weak magnetic attraction similar to paramagnetic materials and would reduce the reluctance

of magnetic circuits in the same way.” *Id.* at 69–70 (citing Ex. 1001, 13:59–67; Ex. 1003 ¶ 279; Ex. 1015 ¶ 47).

Petitioner further asserts that an ordinarily skilled artisan would have had a reasonable expectation of success when combining the teachings of Fukumoto, Dong, and Ogusu because the proposed combination “would have required only minor changes to Fukumoto’s disclosed structure.” Pet. 69 (citing Ex. 1003 ¶ 278).

Dr. Wolfe’s testimony supports Petitioner’s assertions. *See* Ex. 1003 ¶¶ 276–279. For example, Dr. Wolfe explains that an ordinarily skilled artisan would have understood that paramagnetic materials “decrease reluctance of the magnetic circuits created during operation” and that “decreasing reluctance would increase efficiency (i.e., greater vibrational force while using less power).” *Id.* ¶ 276.

At this stage of the proceeding, Patent Owner makes no arguments against combining the teachings of Fukumoto, Dong, and Ogusu. *See* Prelim. Resp. 1–17.

Based on the current record, Petitioner establishes sufficiently that an ordinarily skilled artisan would have had a reason to combine the teachings of Fukumoto, Dong, and Ogusu, i.e., for “better efficiency of the magnetic circuit in the vibration module.” *See* Pet. 68–70; Ex. 1003 ¶¶ 276–279. Based on the current record, Petitioner also establishes sufficiently that an ordinarily skilled artisan would have had a reasonable expectation of success when combining the teachings of Fukumoto, Dong, and Ogusu. *See* Pet. 69; Ex. 1003 ¶ 278.

5. PRELIMINARY CONCLUSION ABOUT OBVIOUSNESS/NONOBVIOUSNESS

As discussed above, Petitioner's analysis addresses how the combined disclosures in Fukumoto, Dong, and Ogusu teach claim 14's subject matter. *See supra* § IV.F.3. Additionally, Petitioner provides a reason with rational underpinning as to why an ordinarily skilled artisan would have been motivated to combine the teachings of Fukumoto, Dong, and Ogusu and would have had a reasonable expectation of success. *See supra* § IV.F.4. Hence, Petitioner demonstrates a reasonable likelihood of proving that claim 14 is unpatentable under § 103(a) as obvious over Fukumoto, Dong, and Ogusu.

G. Alleged Obviousness over Fukumoto, Saiki, and Masahiko: Claim 16

Petitioner contends that claim 16 is unpatentable under § 103(a) as obvious over Fukumoto, Saiki, and Masahiko. *See* Pet. 70–75. Above, we provided an overview of Fukumoto. *See supra* § IV.D.1. Below, we provide overviews of Saiki and Masahiko. Then, we consider obviousness issues. As explained below, Petitioner establishes sufficiently for purposes of institution that the combined disclosures in Fukumoto, Saiki, and Masahiko teach claim 16's subject matter.

1. OVERVIEW OF SAIKI (EXHIBIT 1013)

Saiki is a U.S. patent titled “Driving Circuit, Electro-Mechanical-Acoustic Transducer, and Portable Terminal Apparatus,” filed on April 12, 2000, and issued on February 28, 2006. Ex. 1013, codes (12), (22), (45), (54). Saiki states that the invention “relates to an electro-mechanical-acoustic transducer for generating a ringing tone or a ringing vibration for a portable terminal apparatus such as a portable telephone, a pager or a PHS

(personal handy phone set), and a method for driving the same.” *Id.* at 1:9–13; *see id.* at code (57).

Saiki identifies inefficiency as a problem with conventional vibrator driving circuits. *See* Ex. 1013, 1:56–2:6. To address that problem, Saiki discloses vibrator driving circuits that output to a vibrator “at least two signals of different frequencies,” e.g., “a first signal and a second signal.” *Id.* at 2:10–17, 2:23–24, 2:27–28, code (57); *see id.* at 6:34–37, 12:47–50. As an example, the driving circuit may output to the vibrator “a synthesized signal obtained by adding together the first signal and the second signal.” *Id.* at 2:24–26. As another example, the driving circuit may output to the vibrator “a synthesized signal obtained by adding together the first signal and the second signal while shifting a phase of the first signal and a phase of the second signal from each other.” *Id.* at 2:28–32.

Saiki explains that the signal output to the vibrator may be “a series of discrete point frequencies,” e.g., point frequencies P1 to P8, or “a synthesized signal obtained by adding together a plurality of frequency signals P1–P8 while shifting the phases of the signals with respect to one another.” Ex. 1013, 12:15–20, 14:47–50, 14:64–65; *see id.* at 3:26–27, 3:40–41. As an example, the driving circuit may output to the vibrator a synthesized signal “obtained by adding together the eight point frequencies P1–P8, with the lowest frequency P1 being in reverse phase with the next frequency P2, P3 being in phase with P4, P5 being in reverse phase with P6, and P7 being in phase with P8.” *Id.* at 15:24–29.

Saiki also explains that “[b]oth a vibration signal and an acoustic signal can be input so as to reproduce the vibration signal and the sound signal simultaneously.” Ex. 1013, 15:54–57. By “adjusting the signal

frequency band and synthesizing together a plurality of signals,” the vibrator may “function as a multiple function transducer capable of reproducing a vibration signal and a sound signal.” *Id.* at 15:57–60; *see id.* at code (57).

2. OVERVIEW OF MASAHIKO (EXHIBIT 1014)

Masahiko is a U.S. patent titled “Vibration Generating Apparatus,” filed on July 26, 2011, and issued on December 23, 2014. Ex. 1014, codes (12), (22), (45), (54). Masahiko states that the invention “relates to a vibration generating apparatus which can be built into a mobile phone, touch panel, or other device,” and “more particularly relates to a vibration generating apparatus which exhibits a vibration tactile haptic effects of instantaneous vibration.” *Id.* at 1:17–21. Masahiko also states that the invention “was made to solve” a problem with damping and stopping a mechanical vibrator and improve “the sharpness of the stopping of the vibration.” *See id.* at 1:49–64, 2:21–26, 2:36–41, 4:40–46, 10:59–61, 12:28–30, 12:60–61.

Masahiko discloses a vibration-control unit that shortens a mechanical vibrator’s stopping time by, among other things, producing a drive voltage having a frequency “ f ” and a beat vibration having a frequency f_B . *See* Ex. 1014, 1:65–2:41, 11:61–12:61, code (57), Fig. 5. Masahiko includes an example with a drive voltage frequency “ f ” of 130.83 Hz (i.e., less than the vibrator’s damped natural frequency f_d) and a beat vibration f_B of 26.17 Hz. *Id.* at 12:39–42. Masahiko includes an example with a drive voltage frequency “ f ” of 196.25 Hz (i.e., greater than the vibrator’s damped natural frequency f_d) and a beat vibration f_B of 39.25 Hz. *Id.* at 12:55–56.

Masahiko's Figure 5 (reproduced below) depicts a beat vibration:

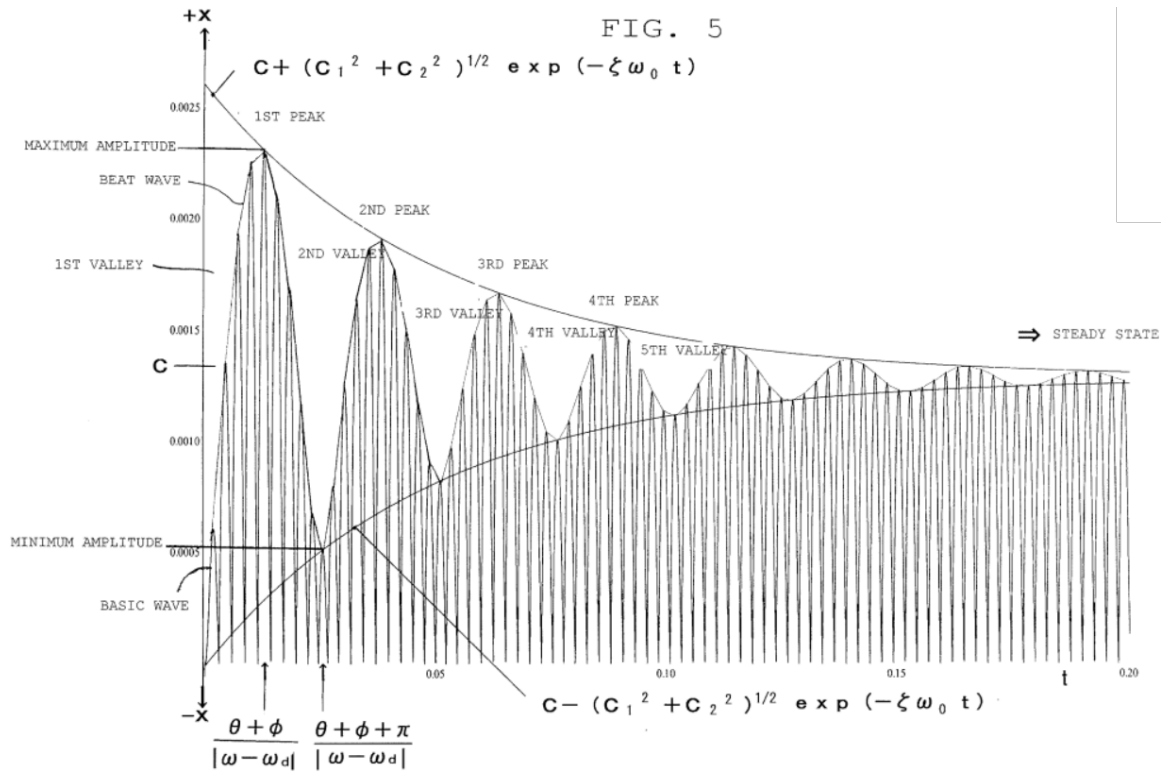


Figure 5 illustrates displacement “x” corresponding to a beat vibration f_B relative to steady-state level “C” for a drive voltage frequency “f” of 196.25 Hz. Ex. 1014, 11:61–64, Fig. 5. Figure 5 identifies the beat vibration f_B as the “beat wave” and the drive voltage frequency “f” as the “basic wave.” *Id.* at Fig. 5.

For the drive voltage waveform, Masahiko discloses using a bipolar sine wave, a bipolar square wave, or a unipolar voltage that swings between different levels. Ex. 1014, 2:48–53, 13:63, 22:54, 23:19–20.

3. DIFFERENCES BETWEEN THE CLAIMED INVENTION AND THE PRIOR ART

Claim 16 reads as follows:

16. The linear vibration module of claim 15 wherein the complex vibration modes include:

- a primary oscillation frequency modulated by a modulating oscillation frequency;
- a beat frequency; and
- an aperiodic oscillation waveform.

Ex. 1001, 17:13–18.

Petitioner contends that claim 16 “would have been obvious over Fukumoto, Saiki, and Masahiko” because (1) Saiki teaches “complex vibration modes” including “a primary oscillation frequency modulated by a modulating oscillation frequency” and (2) Masahiko teaches “a beat frequency” and “an aperiodic oscillation waveform.” Pet. 70, 73.

Specifically, Petitioner asserts that Saiki discloses generating “a synthesized vibration output waveform by combining eight point frequencies (P1–P8) such that those frequencies are either in phase or in reverse phase with each other.” Pet. 70 (citing Ex. 1013, 14:47–15:5, 15:24–37). Petitioner also asserts that an ordinarily skilled artisan would have understood that:

- (1) point frequency P1 corresponds to the claimed “primary oscillation frequency”;
- (2) point frequency P2 corresponds to the claimed “modulating oscillation frequency”; and
- (3) “P1 is modulated by P2 because P1 is in reverse phase with P2.”

Id. at 73 (citing Ex. 1003 ¶ 295; Ex. 1013, 15:24–37).

Further, for the claimed “beat frequency,” Petitioner identifies Masahiko’s disclosure about a beat vibration f_B , i.e., “when $f_d < f$, for example, when $f = 196.25$ Hz at $f_o = 157$ Hz, the beat vibration f_B is 39.25 Hz.” Pet. 73 (citing Ex. 1003 ¶ 296; Ex. 1014, 12:55–56, Fig. 5). For the claimed “aperiodic oscillation waveform,” Petitioner identifies Masahiko’s disclosure about using square waves as drive signals that cause “the excitation and dampening phases to change in a non-repetitive, gradual manner.” *Id.* at 73–74 (citing Ex. 1003 ¶ 299; Ex. 1014, 14:26–53, 22:56–23:59, Figs. 6, 15–16).

At this stage of the proceeding, Patent Owner makes no arguments specific to claim 16. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe’s testimony, Petitioner establishes sufficiently that the combined disclosures in Fukumoto, Saiki, and Masahiko teach claim 16’s limitations. *See* Pet. 70–74; Ex. 1003 ¶¶ 284–285, 287, 293–296, 299, 301.

4. ALLEGED REASONS TO COMBINE THE TEACHINGS OF THE REFERENCES

Petitioner asserts that an ordinarily skilled artisan would have been motivated to combine the teachings of Fukumoto, Saiki, and Masahiko to allow for (1) “greater flexibility and variety of available vibration waveforms” and (2) “more abrupt start and stop to the vibrations as a predictable improvement in the ‘tactile haptic effects’ experienced by a user of a mobile device.” Pet. 71–72, 74 (citing Ex. 1003 ¶¶ 283, 291; Ex. 1013, 15:20–23, 15:46–60; Ex. 1014, 2:13–47, 4:40–46, 10:7–10, 12:55–61).

Petitioner asserts that an ordinarily skilled artisan would have recognized that combining Saiki’s teachings with Fukumoto’s teachings would have amounted to “no more than applying a known technique (Saiki’s frequency signal synthesis) to a known device ready for improvement (Fukumoto’s mobile device including its linear oscillatory actuator and drive signal generation circuit) to yield predictable results (creating additional vibration output options).” Pet. 71 (citing Ex. 1003 ¶ 283). Petitioner also asserts that an ordinarily skilled artisan would have recognized that combining Masahiko’s teachings with the Fukumoto-Saiki combination would have amounted to:

no more than applying a known technique (Masahiko’s beat frequency and aperiodic oscillation) to a known device ready for improvement (the Fukumoto-Saiki combination’s mobile device including a linear oscillatory actuator) to yield predictable results (a linear oscillatory actuator that generates a beat wave frequency to stop voltage application—and thereby vibration generation—abruptly, as well as an aperiodic waveform).

Id. at 74 (citing Ex. 1003 ¶ 288).

Petitioner further asserts that an ordinarily skilled artisan would have had a reasonable expectation of success when combining the teachings of Fukumoto, Saiki, and Masahiko because the proposed combination “would have only needed to make minor software modifications to allow for the different complex vibration waveforms.” Pet. 75 (citing Ex. 1003 ¶ 292).

Dr. Wolfe’s testimony supports Petitioner’s assertions. *See* Ex. 1003 ¶¶ 283, 291–292, 297–298, 300. For example, Dr. Wolfe explains that “quickly dampening vibration when the haptic response is no longer needed” according to Masahiko’s teachings would (1) “create an improved haptic

experience” and (2) “support a wider range of haptic effects such as ticks and jolts.” *Id.* ¶ 297; *see id.* ¶ 300.

At this stage of the proceeding, Patent Owner makes no arguments against combining the teachings of Fukumoto, Saiki, and Masahiko. *See* Prelim. Resp. 1–17.

Based on the current record, Petitioner establishes sufficiently that an ordinarily skilled artisan would have had a reason to combine the teachings of Fukumoto, Saiki, and Masahiko, e.g., for “greater flexibility and variety of available vibration waveforms.” *See* Pet. 71–72, 74; Ex. 1003 ¶¶ 283, 286, 291, 297, 300. Based on the current record, Petitioner also establishes sufficiently that an ordinarily skilled artisan would have had a reasonable expectation of success when combining the teachings of Fukumoto, Saiki, and Masahiko. *See* Pet. 75; Ex. 1003 ¶¶ 292, 298.

5. PRELIMINARY CONCLUSION ABOUT OBVIOUSNESS/NONOBVIOUSNESS

As discussed above, Petitioner’s analysis addresses how the combined disclosures in Fukumoto, Saiki, and Masahiko teach claim 16’s subject matter. *See supra* § IV.G.3. Additionally, Petitioner provides a reason with rational underpinning as to why an ordinarily skilled artisan would have been motivated to combine the teachings of Fukumoto, Saiki, and Masahiko and would have had a reasonable expectation of success. *See supra* § IV.G.4. Hence, Petitioner demonstrates a reasonable likelihood of proving that claim 16 is unpatentable under § 103(a) as obvious over Fukumoto, Saiki, and Masahiko.

*H. Alleged Obviousness over Ogusu
and Fukumoto: Claims 1, 2, 7, 11, 15, and 17*

Petitioner contends that claims 1, 2, 7, 11, 15, and 17 are unpatentable under § 103(a) as obvious over Ogusu and Fukumoto. *See* Pet. 75–91.

Above, we provided overviews of Ogusu and Fukumoto. *See supra* §§ IV.D.1, IV.F.2. Below, we consider obviousness issues. As explained below, Petitioner establishes sufficiently for purposes of institution that the combined disclosures in Ogusu and Fukumoto teach the subject matter in claims 1, 2, 7, 11, 15, and 17.

1. INDEPENDENT CLAIM 1

(a) Preamble 1[pre]

Claim 1 recites “[a] linear vibration module.” Ex. 1001, 15:36.

Petitioner contends that Ogusu teaches claim 1’s preamble because Ogusu discloses “a ‘vibration actuator’ using a moving magnet.” Pet. 77–78 (citing Ex. 1003 ¶ 305; Ex. 1015 ¶¶ 1–2). Further, Petitioner asserts that “Ogusu’s vibration actuator is linear in the same way as the ’081 patent.” *Id.* at 78 (citing Ex. 1001, 2:17–23; Ex. 1015 ¶¶ 31–32, Figs. 1, 4).

At this stage of the proceeding, Patent Owner makes no arguments specific to claim 1’s preamble. *See* Prelim. Resp. 1–17.

Generally, a preamble does not limit a claim. *Allen Eng’g*, 299 F.3d at 1346. We need not decide whether claim 1’s preamble limits the claim because, based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe’s testimony, Petitioner establishes sufficiently that Ogusu teaches claim 1’s preamble. *See* Pet. 77–78; Ex. 1003 ¶ 305.

(b) Limitation 1[a]

Claim 1 recites “a housing.” Ex. 1001, 15:37 (limitation 1[a]).

Petitioner contends that the combined disclosures in Ogusu and Fukumoto teach limitation 1[a]. Pet. 78. Specifically, Petitioner asserts that “Ogusu’s vibration actuator is used as a ‘vibration generating means for pager[s].’” *Id.* (alteration by Petitioner) (quoting Ex. 1015 ¶ 2). Petitioner acknowledges that “Ogusu does not explicitly depict a housing for its vibration actuator.” *Id.* But Petitioner asserts that an ordinarily skilled artisan “would have found it obvious and beneficial to enclose Ogusu’s vibration actuator in a housing to protect the components of the vibration actuator during pager assembly.” *Id.* (citing Ex. 1003 ¶ 307).

Further, Petitioner asserts that Fukumoto’s “vibration actuator for use in portable electronic devices” includes case 115a that corresponds to the claimed “housing” and additionally includes main case 101 that corresponds to the claimed “housing” according to Patent Owner’s infringement contentions. Pet. 78 (citing Ex. 1005, 1:13–19, 1:45–50, 13:20–26, Figs. 1, 3; Ex. 1018, 1–5).

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 1[a]. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe’s testimony, Petitioner establishes sufficiently that the combined disclosures in Ogusu and Fukumoto teach limitation 1[a]. *See* Pet. 78; Ex. 1003 ¶¶ 306–307.

(c) Limitation 1[b]

Claim 1 recites “a moveable component.” Ex. 1001, 15:38 (limitation 1[b]).

Petitioner contends that Ogusu teaches limitation 1[b] regardless of whether § 112's means-plus-function provision applies to limitation 1[b]. *See* Pet. 78–79. Specifically, Petitioner identifies Ogusu's movable elements, i.e., bearing 5, holder 6, first yoke 8a, second yoke 8b, magnet 9a, and magnet 9b, as the claimed “moveable component.” *Id.* at 79.

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 1[b]. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe's testimony, Petitioner establishes sufficiently that Ogusu teaches limitation 1[b]. *See* Pet. 78–79; Ex. 1003 ¶¶ 308–310.

(d) Limitation 1[c]

Claim 1 recites “a power supply.” Ex. 1001, 15:39 (limitation 1[c]).

Petitioner contends that Ogusu teaches limitation 1[c] because Ogusu discloses (1) “current in a predetermined direction” applied to “the first coil 2b and the second coil 3b” to create resultant movement and (2) “an input power supplied to the coil.” Pet. 79–80 (citing Ex. 1015 ¶¶ 30–31, 57–58). Petitioner asserts that an ordinarily skilled artisan would have recognized that “applying electrical current to the coils to create resultant movement requires a supply of electric power.” *Id.* at 80 (citing Ex. 1003 ¶ 312).

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 1[c]. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe's testimony, Petitioner establishes

sufficiently that Ogusu teaches limitation 1[c]. *See* Pet. 79–80; Ex. 1003 ¶¶ 311–312.

(e) Limitation 1[d]

Claim 1 recites “user-input features.” Ex. 1001, 15:40 (limitation 1[d]).

Petitioner contends that Ogusu teaches limitation 1[d] and alternatively that the combined disclosures in Ogusu and Fukumoto teach limitation 1[d]. *See* Pet. 80–81. Specifically, Petitioner asserts that Ogusu discloses that “various vibrations can be switched by the selection of the pager control section by the user’s selection.” *Id.* (citing Ex. 1015 ¶ 43). Petitioner asserts that an ordinarily skilled artisan would have recognized that “the user’s selection” teaches the claimed “user-input features.” *Id.* (citing Ex. 1003 ¶ 313).

Further, Petitioner asserts that Fukumoto’s PDA 10 includes a touch panel and push-button type operation keys for a user to input operation instructions. Pet. 80 (citing Ex. 1005, 13:40–14:13, Figs. 1–2). Petitioner asserts that the touch panel and the operation keys correspond to the claimed “user-input features.” *Id.*

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 1[d]. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe’s testimony, Petitioner establishes sufficiently that Ogusu teaches limitation 1[d] and alternatively that the combined disclosures in Ogusu and Fukumoto teach limitation 1[d]. *See* Pet. 80–81; Ex. 1003 ¶¶ 313–314.

(f) Limitation 1[e]

Claim 1 recites “a driving component that drives the moveable component in each of two opposite directions within the housing.”

Ex. 1001, 15:41–42 (limitation 1[e]).

Petitioner contends that the combined disclosures in Ogusu and Fukumoto teach limitation 1[e] regardless of whether § 112’s means-plus-function provision applies to limitation 1[e]. *See* Pet. 81–82. Specifically, Petitioner asserts that Ogusu’s first coil 2b and second coil 3b drive Ogusu’s movable elements “in each of two opposite directions” due to an applied alternating current. *Id.* at 81 (citing Ex. 1015 ¶¶ 31–32). Petitioner also asserts that first coil 2b and second coil 3b generate a force that drives the movable elements according to a “waveform of the current,” e.g., pushing in one direction and pulling in the opposite direction. *Id.* at 81–82 (citing Ex. 1003 ¶ 316; Ex. 1015, Figs. 4(a)–4(e)).

Further, Petitioner asserts that movement would occur “in each of two opposite directions within the housing” when combining Fukumoto’s teachings with Ogusu’s teachings. Pet. 82 (citing Ex. 1003 ¶¶ 317–319).

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 1[e]. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe’s testimony, Petitioner establishes sufficiently that the combined disclosures in Ogusu and Fukumoto teach limitation 1[e]. *See* Pet. 81–82; Ex. 1003 ¶¶ 316–319.

(g) Limitation 1[f]

Claim 1 recites “a control component that controls 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 user input received from the user-input features.” Ex. 1001, 15:44–48 (limitation 1[f]).

Petitioner contends that Ogusu teaches limitation 1[f] if § 112’s means-plus-function provision does not apply to limitation 1[f] and that the combined disclosures in Ogusu and Fukumoto teach limitation 1[f] if § 112’s means-plus-function provision applies to limitation 1[f]. See Pet. 82–84. Specifically, Petitioner asserts that Ogusu discloses a “pager control section” permitting a user to make a selection to switch between “various vibrations.” *Id.* at 83 (citing Ex. 1015 ¶ 43). According to Petitioner, Ogusu’s “various vibrations” result from “applying different currents to the coils according to different waveforms” where the “different waveforms each have different amplitudes and different frequencies.” *Id.* (citing Ex. 1003 ¶ 321; Ex. 1015 ¶¶ 17, 19, 32, 37–42, 55, Figs. 4(a)–4(e)). Petitioner also asserts that a user may select “a waveform of a specific amplitude and frequency.” *Id.* (citing Ex. 1003 ¶ 321; Ex. 1015 ¶ 11, code (57)).

To show representative user-selected waveforms, Petitioner provides an annotated version of Ogusu’s Figure 4 as reproduced below (Pet. 89):

[FIG. 4]

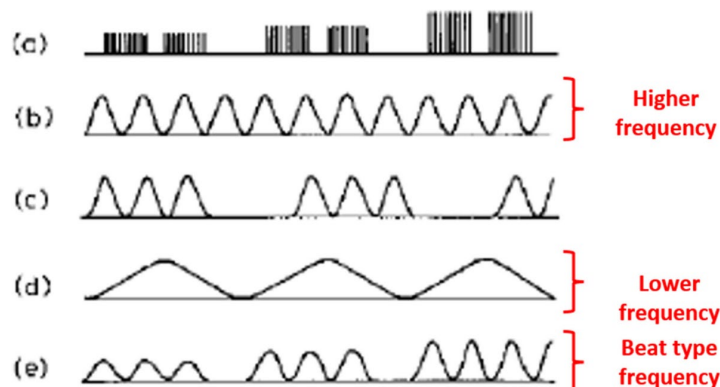


Figure 4 illustrates example current waveforms identified as waveforms (a) through (e) that a signal generator may supply to a vibration actuator's coils. Ex. 1015 ¶¶ 32, 37–41, 61, Fig. 4. The above annotated version of Figure 4 includes the following annotations:

- (1) the red annotation “Higher frequency” next to waveform (b);
- (2) the red annotation “Lower frequency” next to waveform (d); and
- (3) the red annotation “Beat type frequency” next to waveform (e).

See Pet. 89; Ex. 1003 ¶ 333.

Further, Petitioner asserts that Fukumoto discloses a processor, i.e., CPU 113, and that an ordinarily skilled artisan would have understood that Ogusu “uses a processor to choose among the various possible waveforms and to control the supply of power from the power supply to the coils to achieve those waveforms.” Pet. 84 (citing Ex. 1003 ¶¶ 322–323).

According to Petitioner, an ordinarily skilled artisan “would have found it obvious” to use the following in the Ogusu-Fukumoto combination:

- (1) “an H-bridge switch or other equivalent structure to convert power supplied from a battery to the selected waveform”; and
- (2) “an algorithm such as that disclosed in Fukumoto to supply power according to the desired waveform in Ogusu.”

Id.

At this stage of the proceeding, Patent Owner makes no arguments specific to limitation 1[f]. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe’s testimony, Petitioner establishes sufficiently that Ogusu teaches limitation 1[f] and alternatively that the combined disclosures in Ogusu and Fukumoto teach limitation 1[f]. *See* Pet. 82–84; Ex. 1003 ¶¶ 320–325.

(h) Alleged Reason to Combine the Teachings of the References

Petitioner asserts that an ordinarily skilled artisan would have recognized that “Ogusu lacks certain implementation details that were well known as shown in Fukumoto” and “would have been motivated to apply those implementation details to Ogusu.” Pet. 77 (citing Ex. 1003 ¶ 304); *see id.* at 78, 80, 86–87, 91. As an example, Petitioner asserts that an ordinarily skilled artisan “would have been motivated to incorporate user input features such as Fukumoto’s into Ogusu’s pager to allow the user to make selections in Ogusu’s ‘pager control section.’” *Id.* at 80 (citing Ex. 1003 ¶ 314).

Further, Petitioner asserts that incorporating Fukumoto’s implementation details into Ogusu’s pager would have amounted to “no more than applying”:

- (1) “a known technique (Fukumoto’s CPU-controlled PDA vibration generation process) to a known device ready for improvement (Ogusu’s pager control section vibration selection and generation process in a pager) to yield predictable results (a CPU-managed vibration generation process in Ogusu’s pager providing a desired vibration output with a specific amplitude and frequency corresponding to a user input)”; and
- (2) “a known technique (Fukumoto’s process for converting a user input to a drive signal) to a known device ready for improvement (Ogusu’s pager including its vibration actuator) to yield predictable results (a vibration actuator

providing the desired vibration output with a specific amplitude and frequency corresponding to a user input).”

Id. at 86–87, 91 (citing Ex. 1003 ¶¶ 328, 336).

Dr. Wolfe’s testimony supports Petitioner’s assertions. *See* Ex. 1003 ¶¶ 304, 307, 314, 328, 336.

At this stage of the proceeding, Patent Owner makes no arguments against combining Fukumoto’s teachings with Ogusu’s teachings. *See* Prelim. Resp. 1–17.

Based on the current record, Petitioner establishes sufficiently that an ordinarily skilled artisan would have had a reason to combine Fukumoto’s teachings with Ogusu’s teachings in the way Petitioner proposes, i.e., to provide implementation details. *See* Pet. 77–78, 80, 86–87, 91; Ex. 1003 ¶¶ 304, 307, 314, 328, 336. Based on the current record, Petitioner also establishes sufficiently that an ordinarily skilled artisan would have obtained a predictable result when combining Fukumoto’s teachings with Ogusu’s teachings. *See* Pet. 86–87, 91; Ex. 1003 ¶¶ 328, 336.

(i) Preliminary Conclusion About Obviousness/Nonobviousness

As discussed above, Petitioner’s analysis addresses how the combined disclosures in Ogusu and Fukumoto teach claim 1’s subject matter. *See supra* §§ IV.H.1(a)–(g). Additionally, Petitioner provides a reason with rational underpinning as to why an ordinarily skilled artisan would have been motivated to combine Fukumoto’s teachings with Ogusu’s teachings in the way Petitioner proposes and would have obtained a predictable result. *See supra* § IV.H.1(h). Hence, Petitioner demonstrates a reasonable

likelihood of proving that claim 1 is unpatentable under § 103(a) as obvious over Ogusu and Fukumoto.

2. DEPENDENT CLAIMS 2, 7, 11, 15, AND 17

Claims 2, 7, 11, 15, and 17 depend directly from claim 1. Ex. 1001, 15:49–61, 16:29–33, 16:50–54, 17:9–12, 17:19–24.

For claims 2, 7, 11, 15, and 17, Petitioner provides an analysis supported by Dr. Wolfe’s testimony about how the combined disclosures in Ogusu and Fukumoto teach each limitation in each claim. *See* Pet. 84–91; Ex. 1003 ¶¶ 326–337.

At this stage of the proceeding, Patent Owner makes no arguments specific to claims 2, 7, 11, 15, and 17. *See* Prelim. Resp. 1–17.

Based on the current record and for the reasons advanced by Petitioner and supported by Dr. Wolfe’s testimony, Petitioner establishes sufficiently that the combined disclosures in Ogusu and Fukumoto teach the limitations in claims 2, 7, 11, 15, and 17. *See* Pet. 84–91; Ex. 1003 ¶¶ 326–337. Also, as discussed above, Petitioner provides a reason with rational underpinning as to why an ordinarily skilled artisan would have been motivated to combine Fukumoto’s teachings with Ogusu’s teachings in the way Petitioner proposes and would have obtained a predictable result. *See supra* § IV.H.1(h). Hence, Petitioner demonstrates a reasonable likelihood of proving that claims 2, 7, 11, 15, and 17 are unpatentable under § 103(a) as obvious over Ogusu and Fukumoto.

V. CONCLUSION

Based on the arguments and evidence presented by the parties, we determine that there is a reasonable likelihood Petitioner would prevail with respect to at least one claim challenged in the Petition. Because we find

some challenges sufficient for institution, we institute an *inter partes* review of all challenged claims on all challenges included in the Petition. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1355 (2018) (noting that the language of 35 U.S.C. § 314(b) “indicates a binary choice—either institute review or don’t”); *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (interpreting the statute as requiring “a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition”); 37 C.F.R. § 42.108(a). Additionally, we decline to exercise our discretion under § 314(a) to deny institution.

At this preliminary stage, we have not made a final determination about the patentability of any challenged claim, the construction of any claim term, phrase, or limitation, or any other legal or factual issue.

VI. ORDER

Accordingly, it is

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–9, 11, and 14–17 in the ’081 patent is instituted on all challenges included in the Petition; and

FURTHER ORDERED that, according to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial that commences on the entry date of this decision.

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