

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of: BOSHERNITZAN et al.
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Title: SYSTEM AND METHOD FOR CONTROLLING A TERMINAL
DEVICE

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**PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT
NO. 9,996,738 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42**

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LIST OF EXHIBITS

APPLE-1001	U.S. Patent No. 9,996,738 (“the ’738 patent”)
APPLE-1002	U.S. Patent No. 9,996,738 File History
APPLE-1003	Declaration of Dr. Benjamin B. Bederson
APPLE-1004	U.S. Publication No. 2014/0191963 to Murakoshi (“Murakoshi”)
APPLE-1005	U.S. Publication No. 2015/0348554 to Orr (“Orr”)
APPLE-1006	U.S. Patent No. 4,744,249 to Stewart (“Stewart”)
APPLE-1007	U.S. Publication No. 2009/0265671 to Sachs (“Sachs”)
APPLE-1008	U.S. Publication No. 2015/0123949 to Li (“Li”)
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APPLE-1056	Declaration of Mr. Kyle Wiens re iFixit iPhone 6 Teardown Report webpage and appendices
APPLE-1057-1100	RESERVED
APPLE-1101	Haptic Preliminary Infringement Contentions (March 18, 2024), Case No. 1:23-CV-1351-DII
APPLE-1102	K. Vidal Memorandum on <i>Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation</i> , June 21, 2022
APPLE-1103	Federal Court Management Statistics, December 31, 2023 (retrieved from https://www.uscourts.gov/statistics-reports/federal-court-management-statistics-december-2023)
APPLE-1104	Haptic Response in Opposition to Apple’s Rule 12(b)(6) Motion (February 5, 2024), Case No. 1:23-CV-1351-DII, Document 27
APPLE-1105	Pretrial Order No. 1, Case Management Schedule (May 16, 2024), Case No. 3:24-cv-02296-JSC (after transfer to NDCal), Document 73
APPLE-1106	Table of Scheduled and Actual Trial Dates for Civil Cases Before Judge Corley in NDCal, compiled from data on LexMachina
APPLE-1107	Joint Claim Construction and Prehearing Statement (August 29, 2024), Case No. 3:24-cv-02296-JSC (after transfer to NDCal), Document 101

APPLE-1108	Complaint for Patent Infringement and Jury Demand (November 6, 2023), Case No. 1:23-cv-01351-DII, Document 1
APPLE-1109	Email Correspondence with Haptic (dated September 25, 2024)

LISTING OF CLAIMS

Claim 1	
[1pre]	A control system comprising:
[1a]	a housing having an engagement means for a mounting surface;
[1b-i]	a sensor contained within said housing,
[1b-ii]	said sensor forming an interactive zone defined by a range of said sensor,
[1b-iii]	said sensor being comprised of an accelerometer,
[1b-iv]	said interactive zone being aligned with said mounting surface and overlaying said mounting surface outside a perimeter of said housing,
[1b-v]	said sensor being in a fixed position relative to said engagement means,
[1b-vi]	wherein a contact interaction associated with said mounting surface within said interactive zone is detected by said sensor as data signals,
[1b-vii]	said contact interaction being comprised of an impact on said mounting surface,
[1b-viii]	said data signals being comprised of vibration data of said contact interaction;
[1c-i]	a server in communication with said sensor,
[1c-ii]	said server being comprised of a routing module,
[1c-iii]	a processing module being connected to said routing module, and
[1c-iv]	an output module connected to said processing module,
[1c-v]	said routing module receiving said data signals from said sensor,
[1c-vi]	said processing module determining a data pattern corresponding to said data signals of said contact interaction and matching said data pattern with a gesture profile, said gesture profile being associated with a command; and

[1d-i]	a terminal device
[1d-ii]	being comprised of a receiving module
[1d-iii]	and means for initiating activity of said terminal device corresponding to said command,
[1d-iv]	said terminal device being in communication with said server,
[1d-v]	said output module transmitting said command to said receiving module,
[1e]	wherein said engagement means of said housing comprises: an attachment means between said housing to said mounting surface; and a transmission portion connecting said sensor to said attachment means of said housing and being comprised of a material with flexibility different than said mounting surface so as to set a rigid position of said sensor relative to said mounting surface, said contact interaction generating said data signals of said sensor through said transmission portion.
Claim 2	
[2]	The control system, according to claim 1, wherein said interactive zone of said sensor aligns with said mounting surface, said interactive zone being coplanar with said mounting surface.
Claim 4	
[4a]	The control system, according to claim 1, wherein said contact interaction is comprised of an impact on said mounting surface,
[4b]	said data signals having a respective defined peak corresponding to each impact, a defined time period after a last defined peak, said data pattern being comprised of each defined peak and said defined time period after said last defined peak.

Claim 5	
[5a]	The control system, according to claim 1, wherein said contact interaction is comprised of a plurality of impacts on said mounting surface,
[5b]	said data signals having a respective defined peak corresponding to each impact, a measured time period between each defined peak, and a defined time period after a last defined peak, said data pattern being comprised of each defined peak, each measured time period, and said defined time period after said last defined peak.
Claim 8	
[8]	The control system, according to claim 1, wherein said terminal device is comprised of one device selected from a group consisting of: a television, a thermostat, a computer, a software system, a game console, a fan, a mattress adjustor, an alarm clock, and a lighting fixture.
Claim 9	
[9]	The control system, according to claim 1, further comprising: an additional terminal device being comprised of an additional receiving module and additional means for initiating activity of said additional terminal device corresponding to an additional command, said additional terminal device being in communication with said server, said output module transmitting said additional command to said additional receiving module.
Claim 10	
[10pre]	A method of controlling a terminal device, the method comprising the steps of:
[10a]	installing a housing on a mounting surface by an engagement device,
[10b-i]	said housing being comprised of a sensor contained within said housing,
[10b-ii]	said sensor being comprised of an accelerometer,

[10b-iii]	said sensor forming an interactive zone defined by a range of said sensor, said interactive zone being aligned with said mounting surface and overlaying said mounting surface outside a perimeter of said housing,
[10b-iv]	said sensor being in a fixed position relative to said engagement device,
[10c]	wherein said engagement device of said housing comprises: an attachment device between said housing to said mounting surface; and a transmission portion connecting said sensor to said attachment device of said housing and being comprised of a material with flexibility different than said mounting surface so as to set a rigid position of said sensor relative to said mounting surface;
[10d-i]	connecting a server in communication with said sensor,
[10d-ii]	said server being comprised of a routing module,
[10d-iii]	a processing module being connected to said routing module,
[10d-iv]	and an output module connected to said processing module;
[10e-i]	connecting a terminal device in communication with said server,
[10e-ii]	said terminal device being comprised of a receiving module;
[10f]	making a physical impact on said mounting surface so as to generate a contact interaction;
[10g]	detecting said contact interaction as data signals with said sensor, said data signals being comprised of vibration data of said contact interaction, said contact interaction generating said data signals of said sensor through said transmission portion;
[10h]	receiving said data signals from said sensor with said routing module of said server;

[10i]	determining a data pattern corresponding to said data signals of said contact interaction with said processing module;
[10j]	matching said data pattern to a gesture profile with said processing module, said gesture profile being associated with a command;
[10k-i]	transmitting said command to said receiving module of terminal device with said output module of said server,
[10k-ii]	said command corresponding to activity of said terminal device; and
[10l]	performing said activity with said terminal device.
Claim 11	
[11]	The method of controlling the terminal device, according to claim 10, wherein the step of making a physical impact on said mounting surface further comprises making a plurality of physical impacts on said mounting surface, said contact interaction being associated with more than one physical impact.

CONVENTIONS OF THE PETITION

- All emphasis is added unless noted otherwise;
- Phrases like “as discussed” incorporate fully the analysis of the cross-cited portion of the Petition.

Apple Inc. (“Apple”) petitions for IPR of claims 1-2, 4-5, and 8-11 (“Challenged Claims”) of U.S. Patent No. 9,996,738 (“the ’738 patent”).

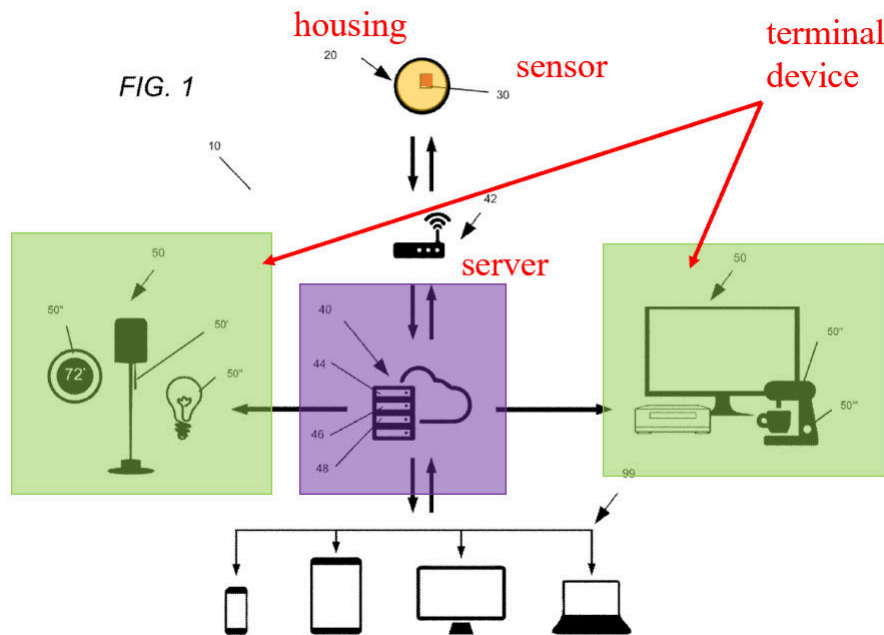
I. STANDING

Apple certifies the ’738 patent is available for IPR. This petition is being filed within one year of service of a complaint *Haptic Inc. v. Apple Inc.*, 1-23-cv-01351 (WDTX), filed 11/6/2023 (case no. 3:24-cv-02296-JSC after transfer to NDCal). APPLE-1108. Apple is not barred or estopped from challenging the Challenged Claims on the below-identified grounds.

II. THE ’738 PATENT

A. Brief Description

The ’738 patent discusses “a system to detect gestures on a mounting surface and to generate commands for the terminal device based on detected gestures.” APPLE-1001, 1:45-48. The system allows a user to control a terminal device by knocking on a surface on which a housing and sensor are mounted, for example “a knock on a wall lowering a thermostat.” *Id.*, Abstract.



APPLE-1001, Fig. 1 (annotated)

As illustrated above, “the control system 10 includes a housing 20 engaged to a mounting surface 22, a sensor 30 within the housing 20 [to sense vibrations of the mounting surface], a server in communication with the sensor 30 [to process the vibrations and identify an associated command], and a terminal device 50 in communication with the server 40 [to receive the associated command].” APPLE-1001, 6:49-53, 8:53-55.¹ The ’738 patent’s system “convert[s] any independent

¹ Interfaces 99, not referenced in the claims, are for “adjust[ing] the settings of the control system” and these devices may be terminal devices. APPLE-1001, 6:53-61.

mounting surface into a controller for a terminal device” by fixing a housing 20 to the surface by “an engagement means.” *Id.*, 4:32-44. “FIG. 4 shows an embodiment of the engagement means 24 being comprised of an attachment means 26 between the housing 20 to the mounting surface 22 and a transmission portion 28 connecting the sensor 30 to the housing 20.” *Id.*, 6:67-7:4.²

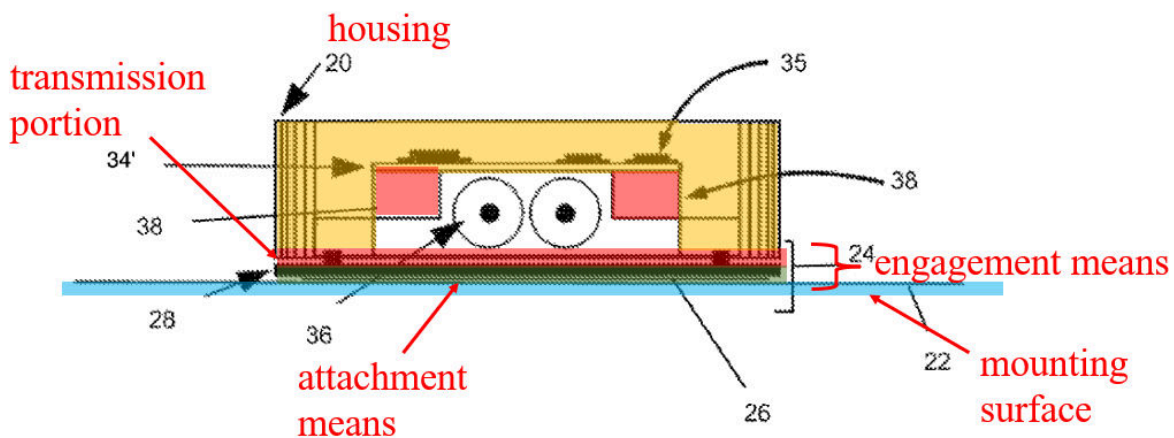


FIG. 4

APPLE-1001, Fig. 4 (annotated)

B. Prosecution History

During prosecution, Applicant made significant amendments to distinguish cited prior art references, arguing no disclosure of “the transmission portion of the engagement means and relationship of the sensor relative to the mounting surface

² Frames and brackets 38 (red in Fig. 4) are also part of the transmission portion.

APPLE-1001, 7:7-9.

set by the transmission portion.” APPLE-1002, 97-110, 133-143. Applicant further argued “[t]he present invention only enhances one surface, using a particular type of sensor, an accelerometer.” *Id.*, 143. However, as discussed in §IV, these features, including the claimed accelerometer arrangement (under Apple’s construction or under Haptic’s construction and apparent understanding, as discussed below), are taught in one or more of Murakoshi, Stewart, Sachs, Orr, Li, and iFixit, none of which the Office considered. APPLE-1003, ¶¶44-53.

C. Priority Date

The ’738 patent was filed 2/12/2016, claiming priority to 2/13/2015 (“Critical Date”). APPLE-1001, 1. Apple does not concede the claimed priority date is correct but applies art predating it.

III. CLAIM CONSTRUCTION

Apple and Haptic submitted a joint claim construction statement (“JCC”) in the NDCA litigation. Haptic also submitted its preliminary infringement contentions. *See* APPLE-1107 (Joint Claim Construction); APPLE-1101, Appendices A-B; *see Donnelly Distribution LLC v. Russo Trading Co., Inc.*, IPR2019-00761, Paper 8, 17-18 (9/6/2019).

Below, Apple provides and addresses both its own constructions (hereinafter, “Apple’s construction(s)”) and Haptic’s constructions (hereinafter, “Haptic’s construction(s)” or “Haptic’s understanding”) based on the JCC and

Haptic’s preliminary infringement contentions. *Gen. Elec. Co. v. Vestas Wind Sys. A/S*, IPR2018-00928, Paper 9, 12-17 (11/5/2018); *10x Genomics, Inc., v. Bio-Rad Labs, Inc.*, IPR2020-00086, Paper 8, 17-22 (4/27/2020). Apple does not endorse Haptic’s constructions but presents them as an alternative construction to illustrate that, regardless of the claim constructions, the art invalidates the claims. APPLE-1003, ¶¶54-91.

Regarding the terms “engagement means” and “means for initiating activity,” each is a means-plus-function (“MPF”) term subject to a rebuttable presumption that §112(f) applies. *TriMed, Inc., v. Stryker Corp.*, 514 F.3d 1256, 1259 (Fed. Cir. 2008); APPLE-1003, ¶¶59-65, 88-91. Additionally, several terms recite a “module” for performing recited functionality that a person of ordinary skill in the art (“POSITA”)³ would not have understood as the name for a structure, such that §112(f) applies. *See Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1349 (Fed. Cir. 2015); APPLE-1003, ¶¶71-80, 85-87.

Claim Term	Apple’s Construction	Haptic’s Construction
“engagement means ... wherein said engagement means of said housing comprises: an attachment means between said housing to said mounting surface; and a	<u>Subject to 112(f):</u> Function: • Engagement • Attaching or holding the housing to the mounting surface	<u>Subject to 112(f):</u> Function: • Engagement • Attachment or holding the housing

³ APPLE-1003, ¶¶30-43.

Claim Term	Apple's Construction	Haptic's Construction
transmission portion connecting said sensor to said attachment means of said housing and being comprised of a material with flexibility different than said mounting surface so as to set a rigid position of said sensor relative to said mounting surface, said contact interaction generating said data signals of said sensor through said transmission portion"	• Transmitting data signals from the attachment means to the sensor • Connecting said sensor to said attachment means of said housing to set rigid position of said sensor relative to said mounting surface Structure: • Adhesive, mechanical fasteners, or threaded screws • Transmission portion 28, which includes frames and brackets 38 or a spring loaded portion, each of which are comprised of a material with flexibility different than the mounting surface and reduce damping • Equivalents thereof (APPLE-1001, 4:46-51, 4:65-66, 6:67-7:17, 7:27-29, 8:9-52, FIGS. 3-9; APPLE-1002, 100-102, 141)	to the mounting surface • Connecting the sensor to the housing Structure: • An "attachment means" and a "transmission portion" • Adhesive, mechanical fasteners, threaded screws, screw holes, or other components to hold the housing to the mounting surface • A portion connecting the sensor to the housing, which can be comprised of frames, brackets, a spring loaded portion, or a material with flexibility different than the materials of the mounting surface or surface of the contact interaction • Equivalents thereof
"said contact interaction being comprised of an impact on said mounting surface"	"where the contact interaction is a user impact (e.g., a knock)	No construction necessary

Claim Term	Apple's Construction	Haptic's Construction
	directly on the mounting surface" (APPLE-1001, 1:40-48, 4:31-41, 6:3-6, 6:33-48, 7:35-8:65, FIGS. 5-9; APPLE-1002, 103-104, 133, 142-145)	
"routing module ... said routing module receiving said data signals from said sensor" ⁴	<u>Subject to 112(f):</u> Function: • Routing • Receiving the data signals from the sensor Structure: • Routing module 44 • Equivalents thereof (APPLE-1001, 5:25-31, 9:40-45, 10:59-67, 11:20-24, FIG. 1)	No construction necessary
"processing module ... said processing module determining a data pattern corresponding to said data signals of said contact interaction and matching said data pattern with a gesture profile"	<u>Subject to 112(f):</u> Functions: • Processing • Determining a data pattern corresponding to the data signals • Matching the data pattern with a gesture profile	No construction necessary

⁴ All "module" terms are also found in claim 10.

Claim Term	Apple's Construction	Haptic's Construction
	Structure: - Processing module 46 - Equivalents thereof (APPLE-1001, 5:25-38, 8:66-9:14, 9:40-50, 10:33-36, 10:59-11:2, FIGS. 1-2)	
“output module ... said output module transmitting said command to said receiving module”	<u>Subject to 112(f):</u> Function: - Outputting - Transmitting the command to said receiving module Structure: - Output module 48 - Equivalents thereof (APPLE-1001, 5:25-28, 5:36-38, 9:40-61, 10:59-64, 11:6-9, FIG. 1)	No construction necessary
“terminal device”	“a remote device” (APPLE-1001, Abstract, 1:40-48, 1:54-66, 2:3-8, 2:21-24, 2:38-40, 3:26-29, 3:61-63, 4:31-36, 5:39-55, 6:3-6, 6:33-48, 6:60-61, 9:65-67, 11:43-49, Claim 8, FIG. 1)	No construction necessary
“receiving module”	<u>Subject to 112(f):</u> Function:	No construction necessary

Claim Term	Apple's Construction	Haptic's Construction
	• Receiving Structure: • Receiving module 52 • Equivalents thereof (APPLE-1001, 5:43-36, 5:51-53, 10:63-64, 11:6-9)	
“means for initiating activity of said terminal device corresponding to said command”	<u>Subject to 112(f):</u> Function: Initiating activity of said terminal device corresponding to said command Structure: “switch or other actuating mechanism that changes the status of a terminal device” and equivalents thereof (APPLE-1001, 5:53-55)	Same as Apple's

IV. THE CHALLENGED CLAIMS ARE UNPATENTABLE

Apple requests IPR of the Challenged Claims on the following grounds comprising two main theories, for which Dr. Bederson's Declaration provides additional explanation. APPLE-1003, ¶¶1-437.

Ground	Claims	Basis -§103	Claim Construction
1A	1-2, 8-10	Murakoshi-Stewart	Haptic's
1B	1-2, 4-5, 8-11	Murakoshi-Stewart-Sachs	Haptic's
1C	1-2, 4-5, 8-11	Murakoshi-Stewart-Sachs-Orr	Apple's
2A	1-2, 8-10	Li-iFixit	Haptic's
2B	4-5, 11	Li-iFixit-Sachs	Haptic's

Each reference pre-dates the Critical Date and qualifies as prior art.

Reference	Filing Date	Publication Date	Prior Art Under
Murakoshi	1/8/2013	7/10/2014	§102(a)-(b)
Orr	9/30/2014	12/3/2015	§102(b)
Stewart	7/10/1986	5/17/1988	§102(a)-(b)
Li	11/2/2013	11/2/2013	§102(b)
iFixit	-	9/19/2014	§102(a)-(b)
Sachs	10/15/2008	10/22/2009	§102(a)-(b)

A. GROUND 1A: MURAKOSHI-STEWART

1. Murakoshi

Murakoshi discusses “controlling a user interface of a device [comprising] sensors coupled to a vibratory surface associated with the apparatus” through a user interaction with the surface, such as “scratching or tapping on the vibratory surface.” APPLE-1004, Abstract, [0022], [0018], [0034]; APPLE-1003, ¶¶104-106. Murakoshi's system (below) includes “device 102, an apparatus 104 for controlling a user interface of the device 102, a vibratory surface 106 associated

with the apparatus 104, and an object 108 for interacting with the vibratory surface 106.” APPLE-1004, [0016]-[0017], [0064], [0084].

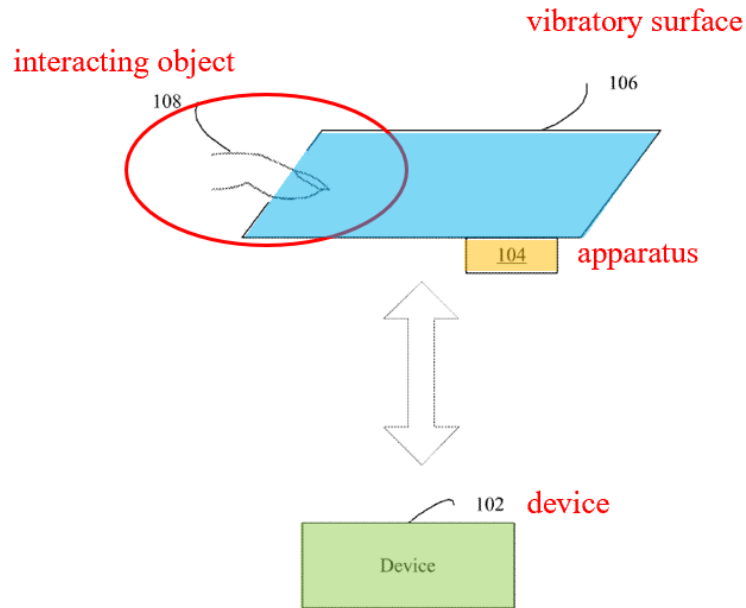


FIG. 1

APPLE-1004, Fig. 1 (annotated)

Fig. 2 shows components of apparatus 104. *Id.*, [0025]. Murakoshi’s sensor (accelerometer) is configured “to detect one or more vibrations of the vibratory surface 106” caused by an interaction of the object with the surface and “generate[s] one or more vibratory signals in response to the detected one or more vibrations.” *Id.*, [0029].

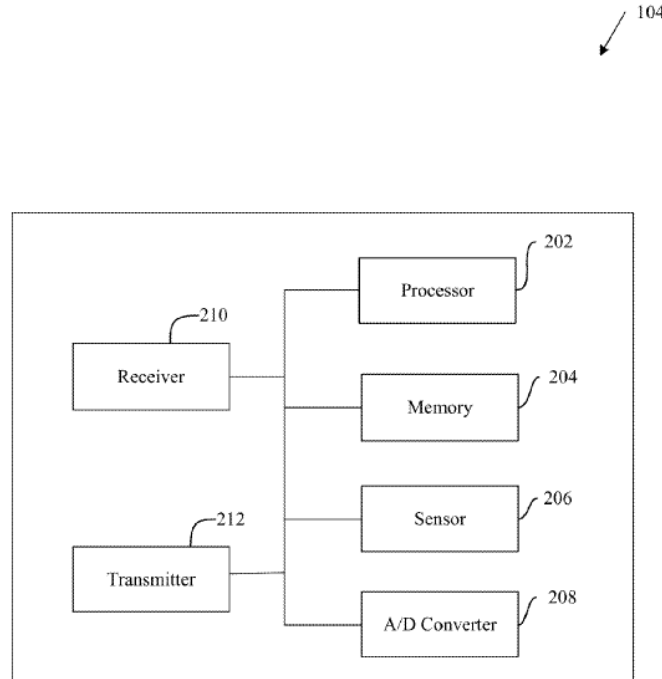


FIG. 2

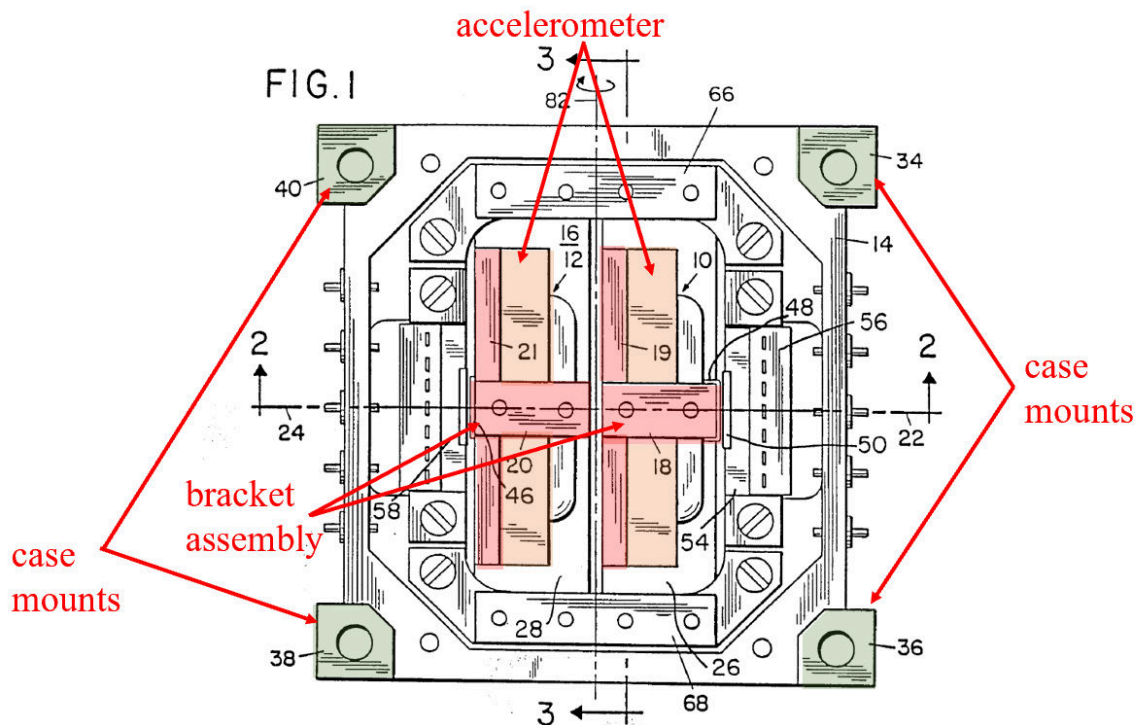
APPLE-1004, Fig. 2

In use, the receiver “receive[s] the vibratory signal generated by the sensor 206 external to the apparatus.” *Id.*, [0031]. The transmitter “transmit[s] a control signal to control the user interface of the device.” *Id.*, [0033]. The processor “convert[s] each of the generated one or more vibratory signals into vibratory signal components,” and “generate[s] a control signal that corresponds to the generated one or more vibratory signals to control the user interface of the device.” *Id.*, [0038], [0036]. The processor identifies a gesture associated with the vibratory signals and “generate[s] a control signal that corresponds to the

determined gesture” and “communicate[s] the generated control signal to the device.” *Id.*, [0048]-[0050].

2. Stewart

Stewart describes a vibrating multisensor including accelerometers “of a force balance type” configured “to provide a signal that is a measure of acceleration of the supporting structure along a predetermined axis.” APPLE-1006, 4:64-68; APPLE-1003, ¶¶107-108. “[A]ccelerometers are positioned within a cavity 16 within the case.” APPLE-1006, 5:8-9.



APPLE-1006, Fig. 1 (annotated)

“Accelerometer 10 is attached to a three-part bracket assembly that includes the finger 18 and the beam 19, [and] [a]ccelerometer 12 is attached to a three-part bracket assembly that includes finger 20 and beam 21.” *Id.*, 5:9-13. “[E]ach combined bracket-and-accelerometer assembly is sandwiched between a pair of spaced-apart flexible sidebeams.” *Id.*, 5:16-18. The case 14 includes “case mounts 34, 36, 38 and 40.” *Id.*, 5:34-37.

3. Murakoshi-Stewart

In Murakoshi-Stewart, Murakoshi’s teaching of positioning an accelerometer within an apparatus, and fixing the apparatus to a vibratory surface, is implemented based on Stewart’s teachings of mounting an accelerometer within a case using brackets and coupling the case to a surface using case mounts and mounting fasteners.⁵ APPLE-1004, [0021], [0029]-[0030]; APPLE-1006, 5:8-9, 5:34-37, Fig. 1; APPLE-1003, ¶¶109-125, 39-43.

A POSITA, aware of Murakoshi and Stewart, would have combined them by attaching an accelerometer within a casing using brackets and sidebeams. APPLE-1006, 5:8-18; APPLE-1003, ¶¶109-113. A POSITA would have further

⁵ In this Petition, Apple proposes an integrated solution based on the respective teachings of the art references, not bodily incorporation or physical integration limited to disclosed implementations.

implemented the combination based on Stewart's teachings to include case mounts on the apparatus casing to fix the apparatus to the vibratory surface using fasteners. APPLE-1004, [0021]; APPLE-1006, 5:34-37; APPLE-1003, ¶¶109-113.

A POSITA would have been motivated to implement Murakoshi and Stewart to arrive at the proposed combination for several reasons.

- Using brackets and fasteners to mount the sensor to the housing and housing to a surface would have been well-known to the POSITA by the Critical Date. APPLE-1003, ¶¶114-116.
- A POSITA would have understood that the accelerometer would operate better if fixed within the apparatus to orient the accelerometer within the housing and prevent it from moving within the housing. APPLE-1003, ¶¶117-118, 39-43; APPLE-1004, [0029]-[0030]; APPLE-1006, Fig. 1.
- A POSITA would have been motivated to securely mount the accelerometer and housing using brackets and case mounts (per Stewart) to enable the accelerometer to detect vibrations without interference from housing components. APPLE-1004, [0021]; APPLE-1006, 7:61-64; APPLE-1003, ¶¶119, 39-43.
- A POSITA would have understood how to couple an apparatus to a surface, per Murakoshi, and been capable of selecting between the possibilities—

including selection of “case mounts” and fasteners, per Stewart. APPLE-1003, ¶¶120-121; APPLE-1004, [0021]; APPLE-1006, 5:36.

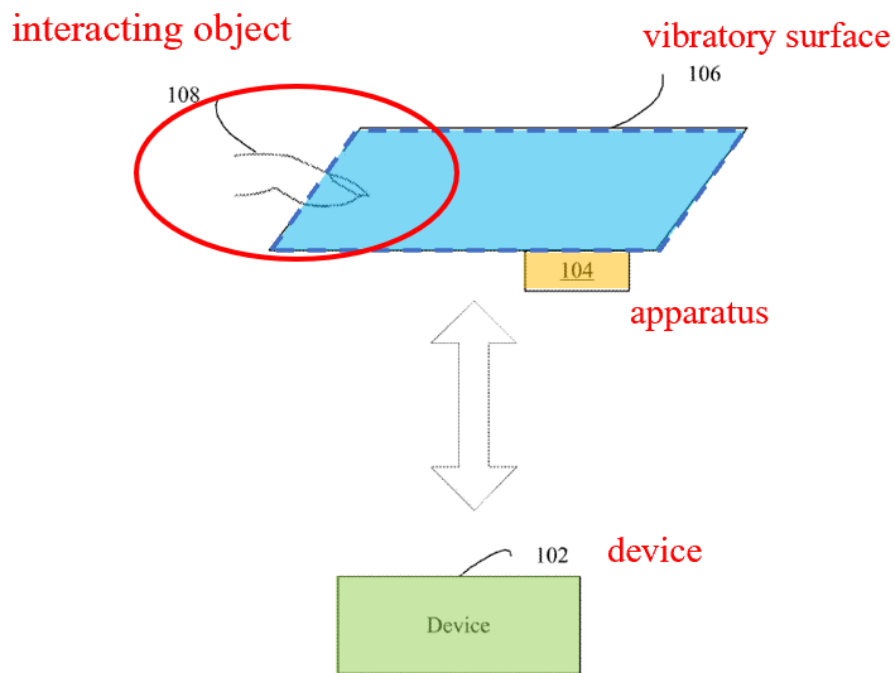
- A POSITA would have recognized that Stewart’s teaching of using brackets is a suitable option that could be used in the context of Murakoshi’s apparatus. APPLE-1003, ¶122; *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007); *Par Pharmaceutical, Inc. v. TWi Pharmaceuticals, Inc.*, 773 F.3d 1186, 1197-98 (Fed. Cir. 2014).
- A POSITA would have understood that the combination of known elements according to known methods would have yielded predictable results, as each element performs a similar function combined as it does separately, the combination would have been well within a POSITA’s skill, at least because mechanisms for fastening sensors within housings and fastening a sensor housing were well known by the Critical Date. APPLE-1003, ¶¶123-125, 39-43. Accordingly, a POSITA would have had a reasonable expectation of success in making the combination, for the bulleted reasons explained above, and because the positioning of an accelerometer within a housing and fastening a housing to a surface were well known to a POSITA by the Critical Date. APPLE-1003, ¶¶123-125.

4. Analysis

a) Claim 1

[1pre]

Murakoshi's Fig. 1 (below) illustrates “device 102, an apparatus 104 *for controlling* a user interface of the device 102, a vibratory surface 106 associated with the apparatus 104, and an object 108 for interacting with the vibratory surface.” APPLE-1004, [0016], [0002], [0005], [0013]; APPLE-1003, ¶¶126-128.

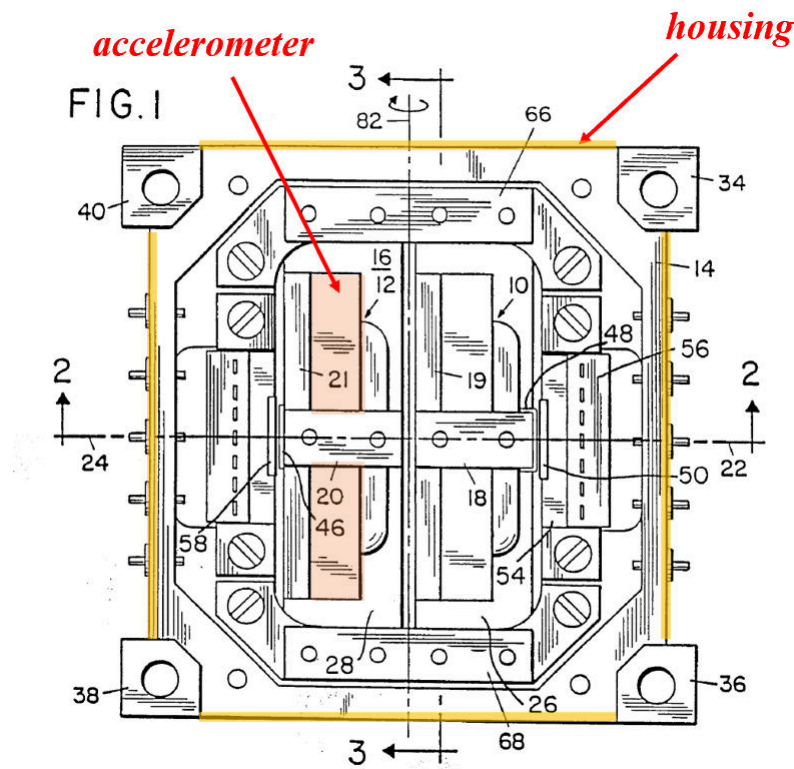


APPLE-1004, Fig. 1 (annotated)

[1a]

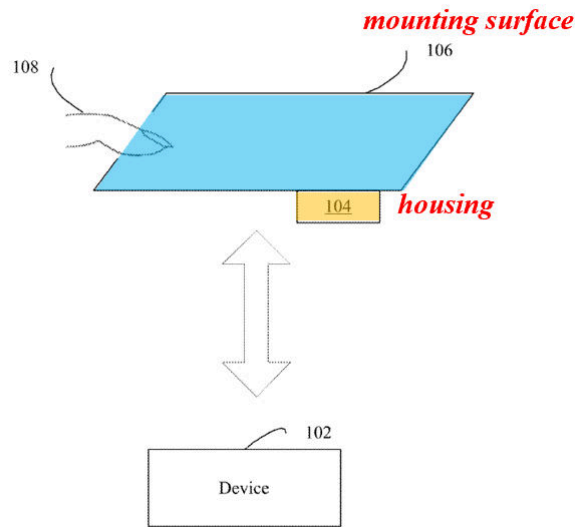
In Murakoshi-Stewart, an apparatus, per Murakoshi, is implemented with Stewart's teachings to position the accelerometer within a casing (housing).

APPLE-1006, 5:8-9, Fig. 1; APPLE-1003, ¶¶129-131; §IV.A.3.



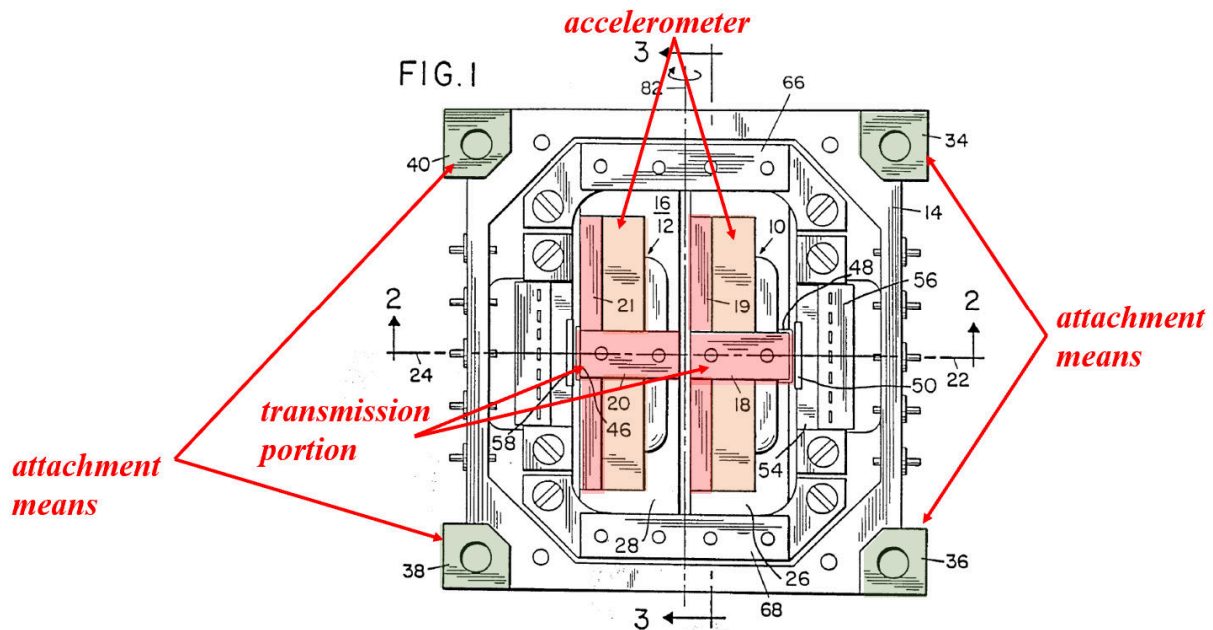
APPLE-1006, Fig. 1 (annotated)

Murakoshi discloses an apparatus mounted to a vibratory (mounting) surface. APPLE-1004, [0021]. Murakoshi discloses “[t]he apparatus 104 may be fixed above and/or below the table top.” *Id.*, [0021]. In Murakoshi’s Figure 1 (below), the apparatus (orange) is fixed below the surface (blue). *Id.*, Fig. 1; APPLE-1003, ¶¶130-131.



APPLE-1004, Fig. 1 (annotated)

Consistent with Haptic’s construction (§III), Murakoshi-Stewart renders obvious “engagement means” based on its disclosure of a casing/housing attached to a vibrational/mounting surface with case mounts for use with fasteners and a bracket assembly to connect the accelerometer to the case, as explained in Stewart. Further §112(f) analysis for the “engagement means” element is provided in [1e].



APPLE-1006, Fig. 1 (annotated)

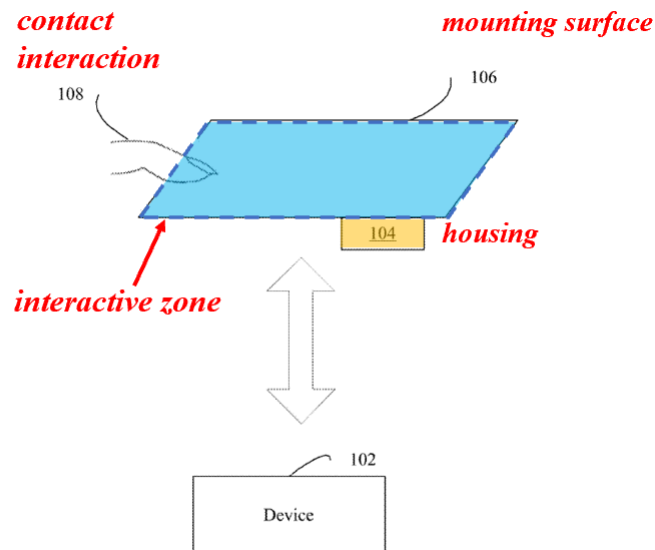
[1b-i]

Murakoshi discloses that the “apparatus” comprises a “sensor.” APPLE-1004, [0025], [0029]-[0030], [0013]. Murakoshi-Stewart is implemented with Stewart’s teaching to position the sensor within a casing, as demonstrated through placement of its accelerometer. APPLE-1006, 5:8-9, Fig. 1; APPLE-1003, ¶¶132-133; §IV.A.3.

[1b-ii]

Murakoshi discloses that the sensor detects vibrations of a vibratory (mounting) surface within “a pre-defined region” (interactive zone). APPLE-1004, [0021], [0013], [0016], Fig. 1; APPLE-1003, ¶¶134-135. Murakoshi describes “a user may *interact at any location within the pre-defined region* of

the vibratory surface 106 to control the user interface of the device 102.” *Id.*,
[0034].



APPLE-1004, Fig. 1 (annotated)

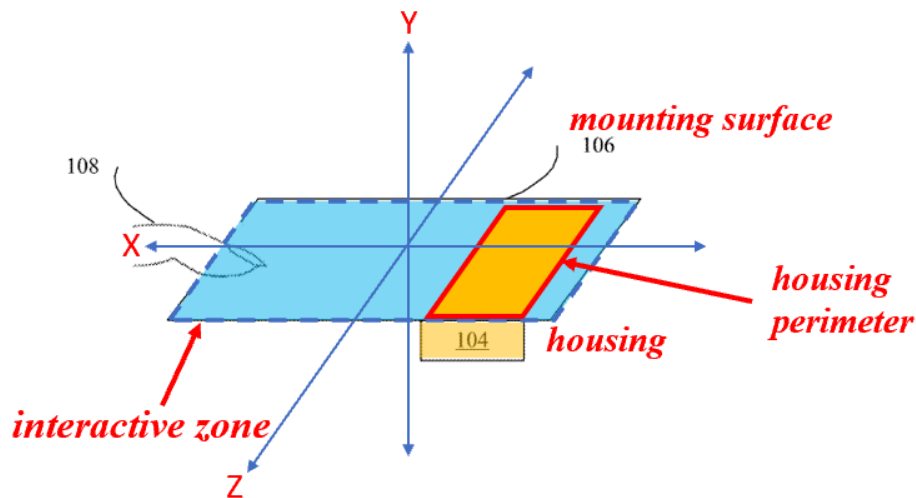
Fig. 1 depicts an interaction of an object with the vibratory (mounting) surface for detection by the sensor in the apparatus (housing). APPLE-1004, [0016], [0021]. A POSITA would have understood from Murakoshi’s discussion of a vibratory surface that it defines a zone within range of the sensor enabling sensor detection of user interactions with the surface. APPLE-1003, ¶¶134-135.

[1b-iii]

Murakoshi discloses that “*sensor 206 may include... an accelerometer.*” APPLE-1004, [0029], [0092]; APPLE-1003, ¶136.

[1b-iv]

Demonstrating obvious under Haptic's understanding of the meaning of this limitation as evidenced by Haptic's infringement contentions (APPLE-1101, 15-16, 50-51), a pre-defined region corresponding to the vibratory (mounting) surface is aligned with and overlays the vibratory surface, per Murakoshi. APPLE-1004, [0021], [0029], [0016], [0021], Fig. 1; APPLE-1003, ¶¶137-140. For example, Murakoshi's pre-defined region (dotted blue) is formed on the vibratory surface (light blue), thus **overlaying** the mounting surface. APPLE-1003, ¶¶138-139. Additionally, both extend as planes in the X-Z directions and are thus **aligned**. APPLE-1003, ¶¶138-139.



APPLE-1004, Fig. 1 (annotated; modified)

Finally, Murakoshi's Fig. 1 illustrates a pre-defined region (dotted blue) extending in each of several directions outside the perimeter of the apparatus's housing (red outline). APPLE-1004, [0016], Fig. 1; APPLE-1003, ¶¶139-140.

[1b-v]

As described above, Murakoshi-Stewart renders obvious an “engagement means” based on case mounts used with fasteners attaching an accelerometer housing to a surface (attachment means) and a bracket assembly attaching within the housing the accelerometer relative to the case mounts (transmission portion), per Stewart. §IV.A.4.[1a]; APPLE-1004, [0021], [0030]; APPLE-1006, 5:8-37; 5:54-651; Fig. 1; APPLE-1003, ¶¶141-142, 39-43; §IV.A.3; §III.

A POSITA would have understood that, in Murakoshi-Stewart, an accelerometer, per Murakoshi, is held within the apparatus casing in a fixed position relative to the bracket assembly, fasteners, and case mounts (collectively, engagement means) which position the accelerometer relative to the mounting surface. APPLE-1006, Fig. 1, 5:7-33; APPLE-1003, ¶142. Further, it would have been obvious to a POSITA to hold a sensor in a fixed position relative to a sensing surface to provide a fixed reference point for accurate detection of vibratory signals. APPLE-1003, ¶¶39-43, 142.

[1b-vi]

Murakoshi-Stewart tracks the ’738 patent’s preferred embodiment and renders obvious the structures recited in [1b-i] to [1b-v] and function of detecting data signals recited in [1b-vi]. Notably, the ’738 patent states that “[w]hen the sensor is an accelerometer, the data signals are vibration data.” APPLE-1001,

5:11-13; *see id.*, 4:65-66, 10:57-68, Fig. 2.

Thus, the Murakoshi-Stewart accelerometer “*may detect one or more vibrations*” when an object interacts with the vibratory surface and a POSITA would have understood the detected vibrations are “vibration data” consistent with the ’738 patent’s description of data signals. APPLE-1004, [0082], [0035]-[0036]; APPLE-1003, ¶¶143-145.

[1b-vii]

Murakoshi states “a user may scratch and/or *tap at any location on the vibratory surface 106* using the object 108.” APPLE-1004, [0035], [0022]; APPLE-1003, ¶¶146-147.

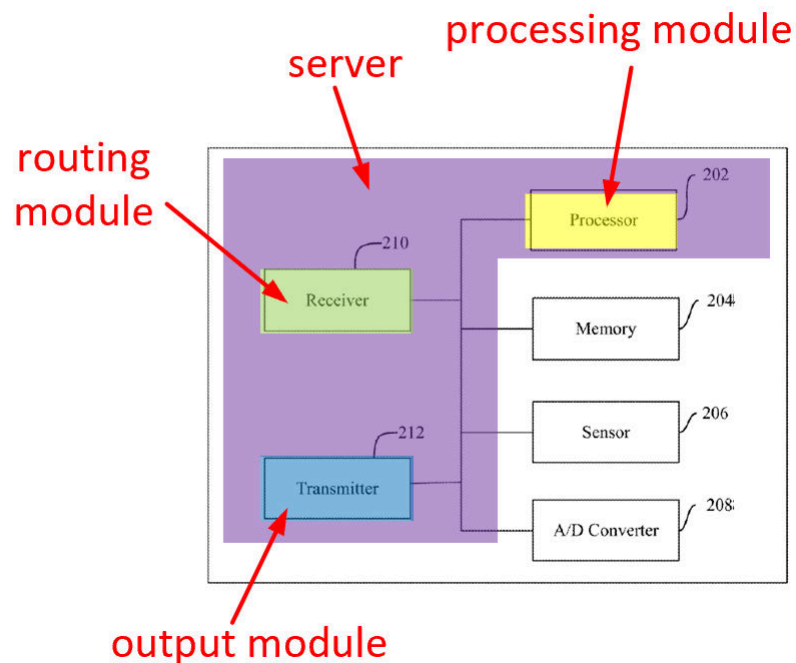
[1b-viii]

Like the ’738 patent, Murakoshi-Stewart’s accelerometer detects vibrations (data signals) of the vibratory surface associated with an interaction of an object with the vibratory (mounting) surface. APPLE-1004, [0082], [0036], [0029], [0032]; APPLE-1001, 5:11-12, 10:57-68, Fig. 2; APPLE-1003, ¶148; §IV.A.4.[1b-vi]. The accelerometer “may detect one or more *vibrations* of the vibratory surface caused by an interaction of an object” with the surface. APPLE-1004, Abstract, [0065], [0082]-[0085]; APPLE-1003, ¶148.

[1c-i]

Consistent with Haptic’s understanding of the meaning of the claim term

“server” as evidenced by Haptic’s infringement contentions (APPLE-1101, 20-28, 54-60), Murakoshi-Stewart renders obvious [1c-i] based on Murakoshi’s disclosure of “suitable logic, circuitry, interfaces, and/or code” “to control the user interface of the device 102 based on an interaction of the object 108 with the vibratory surface.” APPLE-1004, [0018]; APPLE-1101, 20-28, 54-60. As illustrated below, the apparatus includes various components, including a processor “communicatively coupled to ... sensor,” a receiver, and transmitter – the claimed components of the server, as described further below. APPLE-1004, [0026], Abstract, [0025]; APPLE-1003, ¶¶149-150.



APPLE-1004, Fig. 2 (annotated)

[1c-ii]

Murakoshi-Stewart renders obvious a “routing module,” e.g., based on Murakoshi’s disclosure of receiver 210, that routes and “receive[s] the vibratory signal generated by the sensor” (see Fig. 2, above). APPLE-1004, [0032], [0018], [0025]; APPLE-1003, ¶151.

[1c-iii]

Murakoshi-Stewart renders obvious a “processing module” connected to the routing module (see Fig. 2, above). APPLE-1004, [0026] (“receiver ... communicatively coupled to the processor”), [0013], [0023]-[0027], [0036], [0048]; APPLE-1003, ¶152.

[1c-iv]

Murakoshi-Stewart renders obvious an “output module” (transmitter) connected to the processing module (see Fig. 2, above). APPLE-1004, [0026] (“transmitter ... communicatively coupled to the processor”), [0048]; APPLE-1003, ¶153.

[1c-v]

A POSITA would have understood from Murakoshi that the server includes a receiver for receiving vibratory signals from the accelerometer, and that, in Murakoshi-Stewart, the signals received at the receiver from the accelerometer would be routed within the server for processing. APPLE-1004, [0032] (receiver

“receive[s] the vibratory signal generated by the sensor”), [0025]-[0026], [0018], [0089], Fig. 2; §IV.A.4.[1c-ii]; APPLE-1003, ¶154-155.

[1c-vi]

Murakoshi teaches a processor that determines a data pattern (vibratory signal components) corresponding to the data signals and matches the data pattern with a gesture profile (control signal corresponding the one or more generated vibratory signals). APPLE-1004, [0038]; *see* §IV.A.4.[1c-iii], §III; APPLE-1003, ¶¶156-159. Murakoshi’s apparatus may “generate one or more vibratory signals in response to the detected one or more vibrations” after which the processing module “convert[s] each of the generated one or more vibratory signals into vibratory signal components.” APPLE-1004, [0013], [0038]. A POSITA would have understood that vibratory signal components (e.g., vibration frequency) form or render obvious a data pattern determined by the processor and corresponding to the data signals of the object interacting with the vibratory (mounting) surface, per Murakoshi. APPLE-1004, [0038], [0015], [0028], [0042]-[0044]; *see* APPLE-1001, 5:5-8; APPLE-1003, ¶¶156-157.

In Murakoshi, “processor 202 may determine a control signal that corresponds to the determined vibration frequency based on frequency-operation mapping data stored in the memory.” APPLE-1004, [0048], [0023], [0025], [0027], [0036], [0048]; APPLE-1003, ¶158. A POSITA would have understood

that the processor of Murakoshi-Stewart determines vibratory signal components including vibration frequency (data pattern) and matches the data pattern to frequency-operation mapping data to identify the corresponding control signal—a gesture profile associated with a particular command. APPLE-1003, ¶¶156-159.

[1d-i]

Murakoshi-Stewart renders obvious a “terminal device.” For example, and consistent with Haptic’s construction (§III), Murakoshi teaches devices (e.g., “televisions,” “home appliances,” “lamp[s]”) that perform an action associated with a received control signal. APPLE-1004, [0017], [0064], [0084]; APPLE-1003, ¶¶160-161.

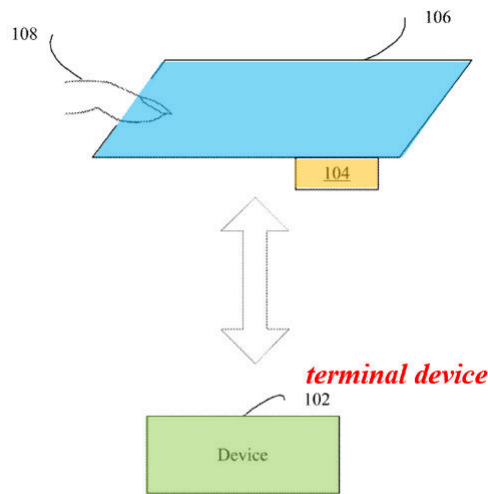


FIG. 1

APPLE-1004, Fig. 1 (annotated)

[1d-ii]

Murakoshi-Stewart renders obvious a “receiving module” of each terminal device. For example, Murakoshi discloses that the (terminal) device includes *“one or more processors and/or circuits... operable to receive a control signal from the apparatus.”* APPLE-1004, [0093]; APPLE-1003, ¶162.

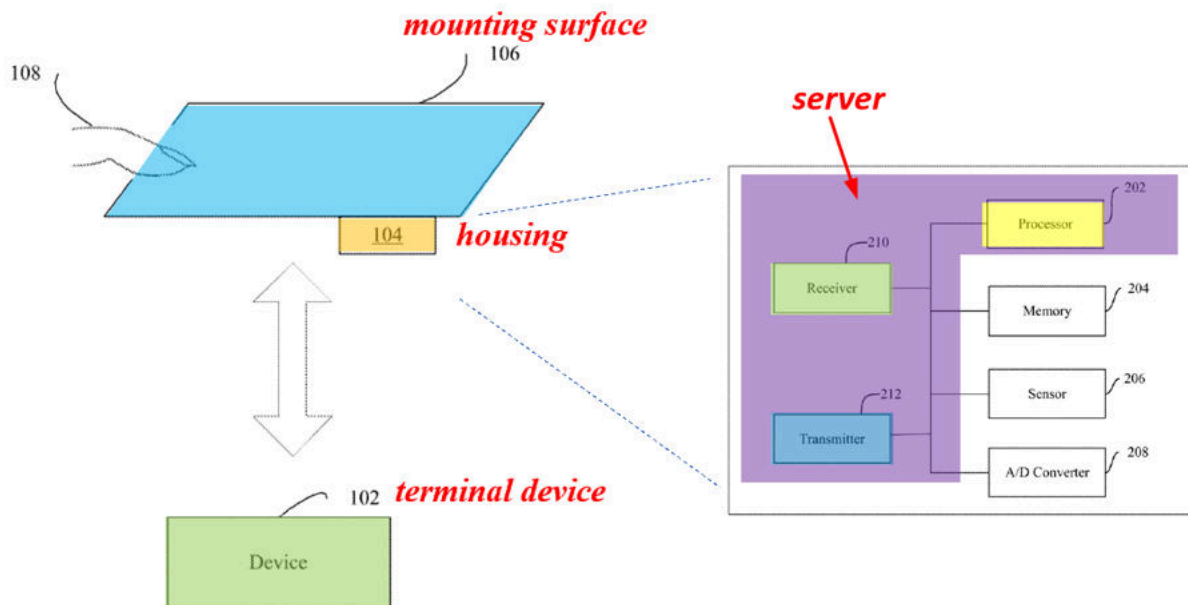
[1d-iii]

Murakoshi-Stewart renders obvious “means for initiating activity” (switch or actuating mechanism) of each terminal device that initiates activity of said terminal device corresponding to said command. APPLE-1003, ¶¶163-165.

For example, Murakoshi discloses that “apparatus 104 may generate a control signal *to switch on* ... when a user may scratch on the center of the table.” APPLE-1004, [0023], [0050], [0093]. Accordingly, Murakoshi discloses that a status (on/off) of the terminal device (lamp) is changed by the control signal. *Id.*; APPLE-1003, ¶¶164-165. A POSITA would have understood the device (terminal device) of Murakoshi-Stewart includes a switch or other actuating mechanism (means for initiating activity) that initiates the activity associated with the control signal received by the device, and that a terminal device that executes a status change would include actuators to operate the terminal device. APPLE-1003, ¶¶164-165.

[1d-iv]

Murakoshi discloses that a processor “may communicate the generated control signal to the device 102 via the transmitter.” APPLE-1004, [0048]. Further, Murakoshi indicates each device “is communicatively coupled to an apparatus 104 (FIG. 1) [such that the] one or more processors and/or circuits [of the terminal device] may be operable to receive a control signal from the apparatus.” *Id.*, [0093]. The processor communicating the control signal, per Murakoshi, is a component of the server. §IV.A.4.[1c-i]; APPLE-1003, ¶¶166-167.



APPLE-1004, Fig. 1 (annotated; modified to include Fig. 2)

Murakoshi discloses a method for “controlling a user interface of a device based on vibratory input” in a system including “a device 102, an apparatus 104 for controlling a user interface of the device 102.” APPLE-1004, [0016], [0018], [0023], Fig. 1. Accordingly, a POSITA would have understood that each terminal device of Murakoshi-Stewart is communicatively coupled to the server. APPLE-1003, ¶167.

[1d-v]

Murakoshi-Stewart renders [1d-v] obvious based on Murakoshi’s disclosure of a transmitter (output module) that outputs and transmits a command to processors and/or circuits (receiving module) of a terminal device to control the device. §IV.A.4.[1c-iv]; APPLE-1004, [0026]; APPLE-1003, ¶168-169.

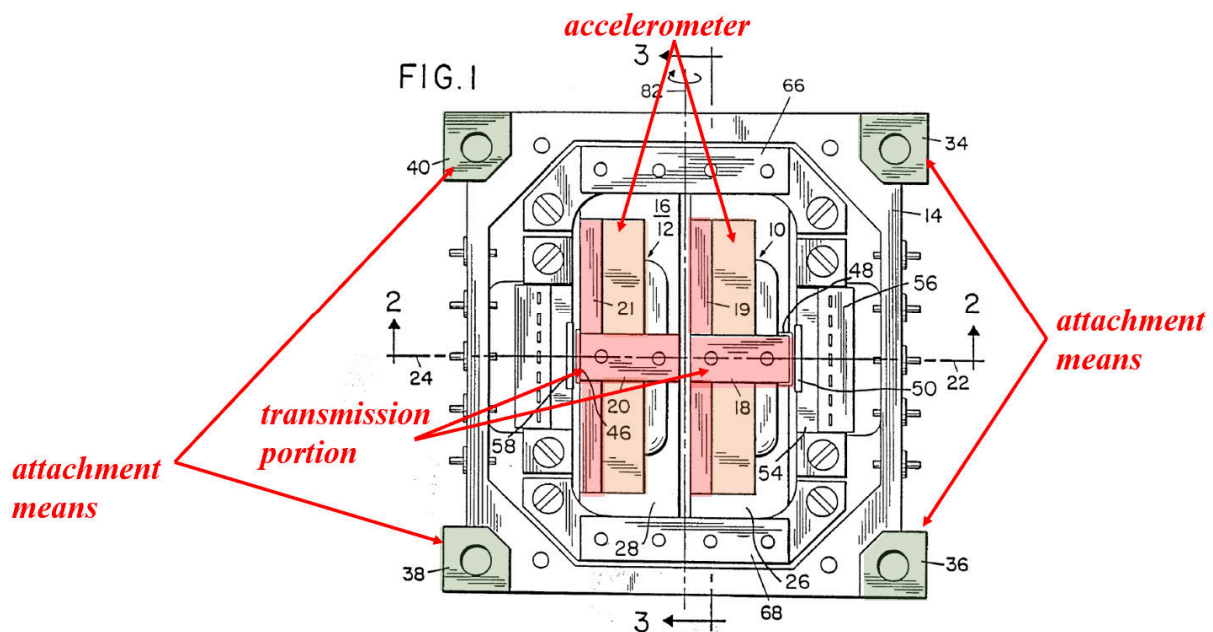
Murakoshi indicates “transmitter 212 may transmit a control signal to control the user interface of the device” (APPLE-1004, [0033]), and “one or more processors and/or circuits [of device 102] may be operable to receive a control signal from the apparatus.” APPLE-1004, [0093]. Accordingly, Murakoshi discloses the transmitter transmits a control signal (command) to the processors/circuits of the device (terminal device). APPLE-1003, ¶¶168-169.

[1e]

Murakoshi-Stewart renders [1e] obvious based on Stewart’s teaching of corresponding structures for performing the same functions, consistent with

Haptic's construction (§III). Specifically, Murakoshi-Stewart renders obvious an “attachment means” based on its teaching that the Murakoshi-Stewart casing includes case mounts, per Stewart, that a POSITA would have understood from Murakoshi are used with fasteners to fix the housing to the mounting surface.

APPLE-1006, 5:34-37 (“case mounts”), 5:8-9, Fig. 1; APPLE-1004, [0021], [0076]; APPLE-1049, [0028], APPLE-1048, [0082]; APPLE-1003, ¶¶170-171, 39-43; §IV.A.3.



APPLE-1006, Fig. 1 (annotated)

Additionally, Murakoshi-Stewart renders obvious a “transmission portion” based on its teaching of a bracket assembly that connects the sensor to the case mounts and fasteners (attachment means) of the casing, per Stewart. APPLE-

1006, 5:8-33, 5:54-61; APPLE-1004, [0013], [0020], [0023], [0029]-[0030], [0036]; APPLE-1003, ¶172.

Murakoshi-Stewart's brackets and case mounts with fasteners collectively perform the same function as the claimed "engagement means." APPLE-1003, ¶¶173-180. Stewart states "[a]ccelerometer 10 is attached to *a three-part bracket assembly*" within the casing. APPLE-1006, 5:9-10, 5:54-61, Fig. 1. Collectively, Murakoshi-Stewart's bracket assembly and case mounts with mechanical fasteners couple a sensor to the housing and the housing to a mounting surface. APPLE-1003, ¶¶170-173; §III. Stewart discloses the accelerometer is held by the bracket assembly within the casing to hold the accelerometer in a position to sense vibrations efficiently. APPLE-1006, 5:8-20, 5:54-61; APPLE-1003, ¶¶170-174, 39-43.

Murakoshi discloses that the vibratory surface can be composed of a variety of materials including "wood, glass, plastic, metal, cardboard, concrete, and the like." APPLE-1004, [0020]. A POSITA would have understood that the composition and structure of the bracket assembly would be different than the vibratory surface (e.g., a tabletop), per Murakoshi, because of differences in material and/or thickness. *Id.*, [0020]-[0023], [0030]; APPLE-1003, ¶¶175-176. Further, a POSITA would have understood that the brackets and casing described by Stewart hold the sensor rigidly in place relative to the attachment means, and

thus also hold the sensor in a rigid position relative to the vibratory surface.

§IV.A.4.[1b-v]; APPLE-1006, 5:8-33, 5:54-6; APPLE-1003, ¶¶174-176.

Finally, regardless of the exact bounds of “said contact interaction generating said data signals of said sensor through said transmission portion,”

Murakoshi-Stewart includes at least the ’738 patent’s preferred embodiment:

“[t]he contact interaction 60 is detected as data signals 70 by the sensor.”

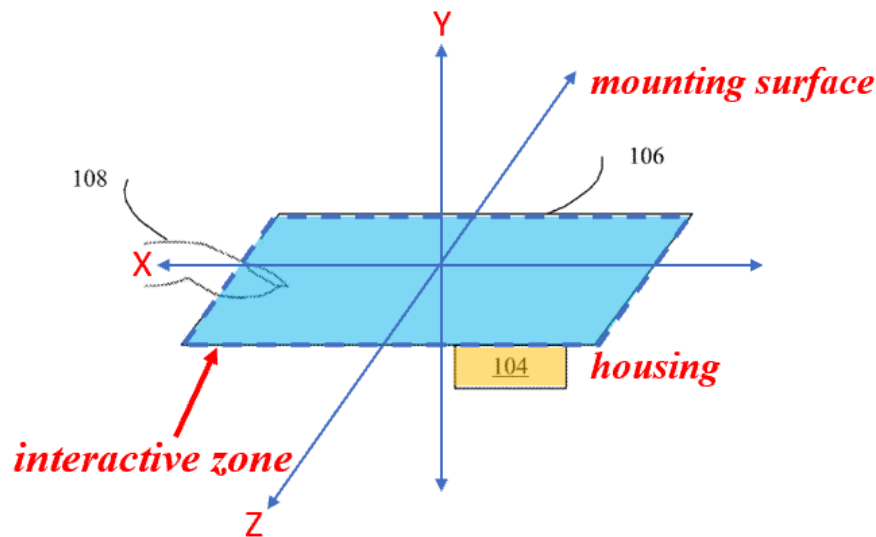
APPLE-1001, 10:57-59, Fig. 2. Similarly, Murakoshi-Stewart’s contact interaction (a tap/scratch on the vibratory surface) is detected as data signals (vibratory signals) by the accelerometer. APPLE-1003, ¶¶177-180; APPLE-1004, [0020], [0023], [0029]-[0030], [0036]; APPLE-1006, 5:8-20, 5:54-6:1; *see* [1a], [1b-vi].

Murakoshi discloses that, “in response to the interaction of the object 108 with the vibratory surface 106, the *sensor 206 may sense vibrations generated in the vibratory surface.*” APPLE-1004, [0036], [0013]. Per Murakoshi, Murakoshi-Stewart’s “sensor 206 may be operable to generate one or more *vibratory signals in response to the detected one or more vibrations.*” *Id.*, [0029], [0036]. Stewart discloses that and accelerometer includes an inertial mass member “positioned and suspended to react to and to provide a signal that is a measure of acceleration of the supporting structure along a predetermined axis.” APPLE-1006, 6:20-32. From Murakoshi and Stewart, a POSITA would have

understood that the vibrations (data signals) associated with tapping on the vibratory surface (contact interaction) are transmitted to the accelerometer through the bracket assembly (transmission portion). APPLE-1003, ¶¶179-180.

b) Claim 2

As described in [1b-iv], Murakoshi discloses that the interactive zone aligns with the mounting surface, consistent with Haptic's understanding of the claim limitation as evidenced by Haptic's infringement contentions (APPLE-1101, 38, 71), and as shown in Fig. 1 below. §IV.A.4.[1b-iv]; APPLE-1004, [0020]-[0021]; APPLE-1003, ¶¶181-182.



APPLE-1004, Fig. 1 (annotated; modified to include axis)

Additionally, as illustrated above, Murakoshi explains that the pre-defined region of the vibratory surface (interactive zone) is defined on the vibratory surface, and thus the interactive zone is *coplanar* with the vibratory (mounting)

surface that it is formed on – they both lie in the *same* X-Z plane. APPLE-1004, [0020]-[0021], [0029]; APPLE-1003, ¶¶181-182.

c) Claim 8

Murakoshi discloses that the device (terminal device) can include “*laptops, tablet computers, televisions... home appliances*” as well as lamps (i.e., at least the claimed “television ... computer ... and a lighting fixture”). APPLE-1004, [0017], [0064], [0084]; APPLE-1003, ¶¶183-184.

d) Claim 9

Murakoshi discloses that the apparatus is “operable to interact with a plurality of [terminal] devices” (APPLE-1004, [0051]) and is “operable to generate different control signals that correspond to one or more interactions” with the vibratory surface (*id.*, [0023]). APPLE-1004, [0085] (“a single apparatus may interact with one or more devices”). Murakoshi’s “processor 202 may be operable to register one or more devices (such as the device 102)” and when a control signal has been generated, “the processor 202 may communicate the generated control signal to the registered device.” *Id.*, [0053]. Accordingly, Murakoshi discloses an additional terminal device that would have the same ability to receive control signals at a receiving module and to perform an associated operation with means for initiating activity as the terminal device described in claim 1. APPLE-1004, [0093], [0023], [0033]; APPLE-1003, ¶¶185-

187; *supra* §IV.A.4.[1d-i]-[1d-v].

e) **Claim 10⁶**

[10pre]-[10k-i]

See [1pre]-[1e] (Ground 1A). *Supra* §§IV.A.4.[1pre]-[1e]; APPLE-1003, ¶¶188-191, 126-180.

[10k-ii]

Murakoshi discloses that the control signal (command) indicates an operation of (terminal) device to be controlled (corresponds to activity of said terminal device). APPLE-1004, [0048] (“[t]he control signal indicates an operation of the device 102 to be controlled in response to the interaction.”), [0023] (“a control signal ***to switch on*** a lamp”), [0050] (“control signal may ***switch on and/or switch off*** the home appliance”); APPLE-1003, ¶¶192-193.

[10l]

Murakoshi discloses that “device 102 may process the received control signal and perform the operation indicated by the control signal.” APPLE-1004, [0084], [0048], [0077]; APPLE-1003, ¶¶194-195.

⁶ Claim 10 is written as a method claim. Nonetheless, the limitations [10pre]-[10k-i] of claim 10 correspond substantially to the limitations of claim 1. APPLE-1003, ¶¶188-190.

B. GROUND 1B: MURAKOSHI-STEWART-SACHS

1. Sachs

Sachs describes “[m]obile devices using motion gesture recognition” by identifying data features in the motion data, where “[d]ata features... are characteristics of the waveform 350 of motion sensor data that can be detected from the waveform 350 and which can be used to recognized that a particular gesture has been performed.” APPLE-1007, [0123], [0101], [0112]; APPLE-1003, ¶¶197-201.

Data features identified in “motion data for a tap gesture” include “a maximum (or minimum) height (or magnitude) [] of the waveform” (APPLE-1007, [0123]), “a detected tap pulse 282 shown as a large magnitude pulse” (*id.*, [0101]-[0102]), “time values appropriate to the data feature detected” (*id.*, [0126]), and “relative timing requirements” (*id.*, [0079]) such as “a predetermined period of time...during which no additional large-magnitude pulses are detected” indicating completion of the gesture. *Id.*, [0094].

2. Murakoshi-Stewart-Sachs

In Murakoshi-Stewart-Sachs, the Murakoshi-Stewart apparatus (described in §IV.A.3) is implemented with Sachs’ teachings to process the vibration signals by identifying data features including large magnitude pulses, timing between features, and a predetermined time following a final impact, as described above.

APPLE-1004, [0090]; APPLE-1007, [0009], [0101]-[0102], [0120]-[0123], FIG. 11A-B; APPLE-1003, ¶¶202-206.

A POSITA would have been motivated to pursue the combination for several reasons:

- Murakoshi's disclosure that the apparatus can be used to map user tap patterns to control signals would have driven a POSITA to look to references like Sachs that describe how to interpret tap patterns from vibration data. APPLE-1004, [0035], [0079], [0090]; APPLE-1003, ¶207.
- A POSITA would have understood that segmenting the vibratory signals into data features, per Sachs, would allow for efficient comparison of specific features of stored signals to identify corresponding commands, instead of comparing the entire signal. APPLE-1004, [0090]; APPLE-1007, [0079]; APPLE-1003, ¶209.
- A POSITA would have appreciated that identification of large magnitude pulses associated with taps minimizes background noise interference, per Sachs. APPLE-1007, [0102]; APPLE-1003, ¶208.
- A POSITA would have understood that identifying timing between features, per Sachs, to provide flexibility in gesture recognition and distinguish between different gestures. APPLE-1007, [0079];

APPLE-1003, ¶210.

- A POSITA would have understood that identifying a time period following an impact, per Sachs, allows for determination that a gesture has been completed. APPLE-1007, [0079]; APPLE-1003, ¶211.
- A POSITA would have understood that the combination of known elements according to known methods, would have yielded predictable results, as each element performs a similar function combined as it does separately, the combination would have been well within a POSITA's skill because identifying features in data for comparison to data profiles was well-known by the Critical Date, as Sachs teaches. APPLE-1003, ¶¶212-214. Accordingly, a POSITA would have had a reasonable expectation of success in doing so for the bulleted reasons explained above, and because identification of data signal features for comparison to a mapped pattern was well known to a POSITA by the Critical Date. APPLE-1003, ¶¶212-214.

3. Analysis

a) Claim 1

[1pre]-[1c-v], [1d-i]-[1e]

See [1pre]-[1c-v] and [1d-i]-[1e] (Ground 1A). Supra §§IV.A.4.[1p]-[1c-

v], [1d-i]-[1e]; APPLE-1003, ¶¶215, 126-155, 160-180.

[1c-vi]

Murakoshi-Stewart-Sachs renders [1c-vi] obvious for the reasons explained above (§IV.A.4.[1c-vi]) and because Sachs describes that “[p]rior gesture recognition for motion sensing device typically consists of examining raw sensor data such as data from gyroscopes or accelerometers, and either hard-coding patterns to look for in this raw data, or using machine learning techniques ... to learn patterns from this data.” APPLE-1007, [0009]. Sachs describes that the motion data associated with a user gesture is examined to detect a particular gesture (contact interaction) and that it was known to use patterns (data patterns) of the motion data (data signals) to match the user motion to an associated gesture (gesture profile) and command. APPLE-1007, [0009]-[0010], [0015], [0101]; APPLE-1003, ¶¶216-218. Sachs’ discloses identifying data features from the signal that form a data pattern associated with a gesture to efficiently match the gesture and intended command. APPLE-1007, [0010], [0015], [0079]; APPLE-1003, ¶¶216-218.

Accordingly, under Haptic’s construction (§III), in Murakoshi-Stewart-Sachs, a processing module (*supra* §IV.A.4.[1c-vi]) determines a pattern of data features (data pattern) corresponding to vibratory signals (data signals) from the interaction of an object with the vibratory surface (contact interaction), per

Murakoshi and using Sachs' teachings, and matches the pattern to a gesture and associated command. APPLE-1007, [0009]-[0010], [0015], [0101], Fig. 9; APPLE-1004, [0013]-[0015], [0023]-[0027], [0036]-[0038], [0048]; APPLE-1003, ¶¶216-218.

b) Claims 2 and 8-9

See claims 2 and 8-9 (Ground 1A). *Supra* §§IV.A.4.[2], [8], [9]; APPLE-1003, ¶¶219, 181-187.

c) Claim 4

[4a]

See [1b-vii] (Ground 1A). *Supra* §IV.A.4.[1b-vii]; APPLE-1004, [0035]; APPLE-1003, ¶¶220-221, 146-147.

[4b]

Murakoshi-Stewart-Sachs processes vibratory signals, per Murakoshi, to identify data features (data pattern), per Sachs, including “large-magnitude pulses” (APPLE-1007, [0101]-[0102]) associated with the interaction (respective defined peak corresponding to the impact) and “a predetermined period of time” (*id.*, [0094]) after an interaction (defined time period after a last defined peak) for determining that the gesture is complete. §IV.B.2; APPLE-1003, ¶¶222-225. A POSITA would have understood that Murakoshi-Stewart-Sachs uses details of the detected vibratory signals, including the features taught by Sachs, such as defined

peak and defined time period, as a data pattern to be matched to an established pattern associated with a user commands. APPLE-1004, [0013], [0018], [0036], [0048]-[0049]; APPLE-1007, [0009], [0094], [0102]; APPLE-1003, ¶225.

d) Claim 5

[5a]

See [4a] (Ground 1B). *Supra* §IV.B.3.[4a]. Murakoshi discloses the interaction of the object with the vibratory surface (contact interaction) includes “a plurality of interactions” on the vibratory (mounting) surface. APPLE-1004, [0050], [0015], [0022], [0035]; APPLE-1007, [0112]; APPLE-1003, ¶¶226-227, 220-221.

[5b]

See [4b] (Ground 1B). *Supra* §IV.B.3.[4b]; APPLE-1007, [0101]-[0102], [0094]; APPLE-1003, ¶¶228-230, 222-225. Additionally, Sachs describes identifying data features (data pattern) including “the timing between different features in motion data” (measured time between each defined peak). APPLE-1007, [0079]; APPLE-1003, ¶¶229-230; §IV.B.2.

e) Claim 10

[10pre]-[10l]

See [10pre]-[10l] (Ground 1A) and [1c-vi] (Ground B). *Supra* §§IV.A.4.[1p]-[1e], IV.B.3.[1c-vi]; APPLE-1003, ¶¶231, 188-191, 216-218.

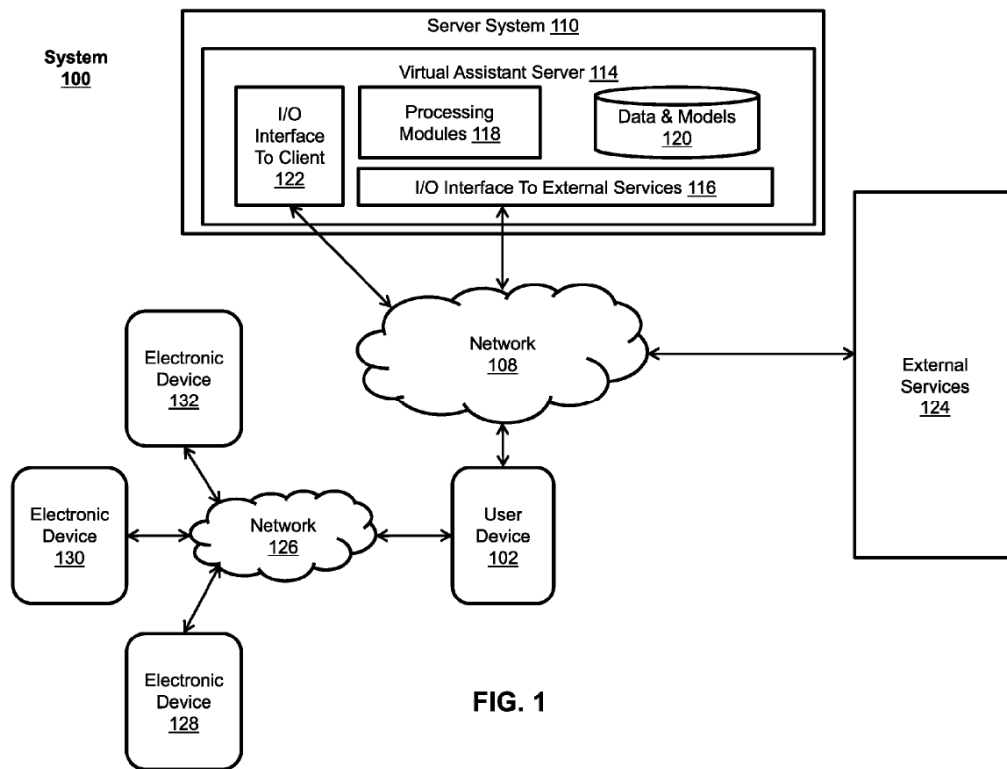
f) Claim 11

See [5a]. *Supra* §IV.B.3.[5a]. As explained above with regard to claim 5, Murakoshi and Sachs both make clear that a user can make a gesture that includes a plurality of impacts (e.g., taps) on a surface. APPLE-1004, [0050]; APPLE-1007, [0112] (“three tap gestures may be required to be detected instead of just one”); APPLE-1003, ¶¶232, 226-227.

C. GROUND 1C: MURAKOSHI-STEWART-SACHS-ORR

1. Orr

Orr describes “using a virtual assistant to control electronic devices” and implementing the assistant “according to a client-server model.” APPLE-1005, Abstract, [0027]; APPLE-1003, ¶¶234-235. “The virtual assistant can include a client-side portion executed on a user device 102, and a server-side portion executed on a server system.” APPLE-1005, [0027]; *see id.*, [0031].



APPLE-1005, Fig. 1

2. Murakoshi-Stewart-Sachs-Orr

In Murakoshi-Stewart-Sachs-Orr, the Murakoshi-Stewart-Sachs apparatus (§IV.B.2) is implemented to process vibratory signals at a cloud-based server, per Orr. APPLE-1003, ¶¶236-243; APPLE-1004, [0025]-[0029], [0013]-[0018], [0036], [0042]-[0049], Fig. 2; APPLE-1007, [0005], [0027]-[0029], Fig. 1.

A POSITA would have been motivated to pursue the combination for several reasons.

- A POSITA would have understood that a cloud-based server provides processing power that would be useful for processing

scratch-based inputs. APPLE-1003, ¶¶244-245; APPLE-1004, [0015], [0042]-[0049], [0077]-[0079].

- A POSITA would have understood that processing sensor data at a server achieves a separation of concerns by allowing server applications and client device applications to be separately maintained and applied. APPLE-1003, ¶¶246-249 (explaining such benefits).
- A POSITA would have understood that implementing Murakoshi-Stewart-Sachs-Orr with an external server decreases apparatus size which could use a smaller-sized processor. APPLE-1003, ¶¶250.
- The use of cloud-based servers was well-known by the Critical Date, and thus would have been implemented with a reasonable expectation of success. APPLE-1003, ¶¶242.
- A POSITA would have understood that using either an internal or an external server are acceptable options for processing signals and would have been capable of selecting between these two, finite, suitable options. APPLE-1003, ¶251; *See KSR*, 550 U.S., 421; *Par Pharmaceutical*, 773 F.3d, 1197-98.
- A POSITA would have understood that the combination of known elements according to known methods would have yielded

predictable results, as each element performs a similar function combined as it does separately, the combination would have been well within a POSITA's skill, at least because the use of cloud-based servers for processing data was well-known by the Critical Date, as were devices that receive user inputs and determine an intended command from the inputs. APPLE-1003, ¶¶252-253, 35-43.

Accordingly, a POSITA would have had a reasonable expectation of success in doing so for the reasons explained above. APPLE-1003, ¶¶252-253.

3. Analysis

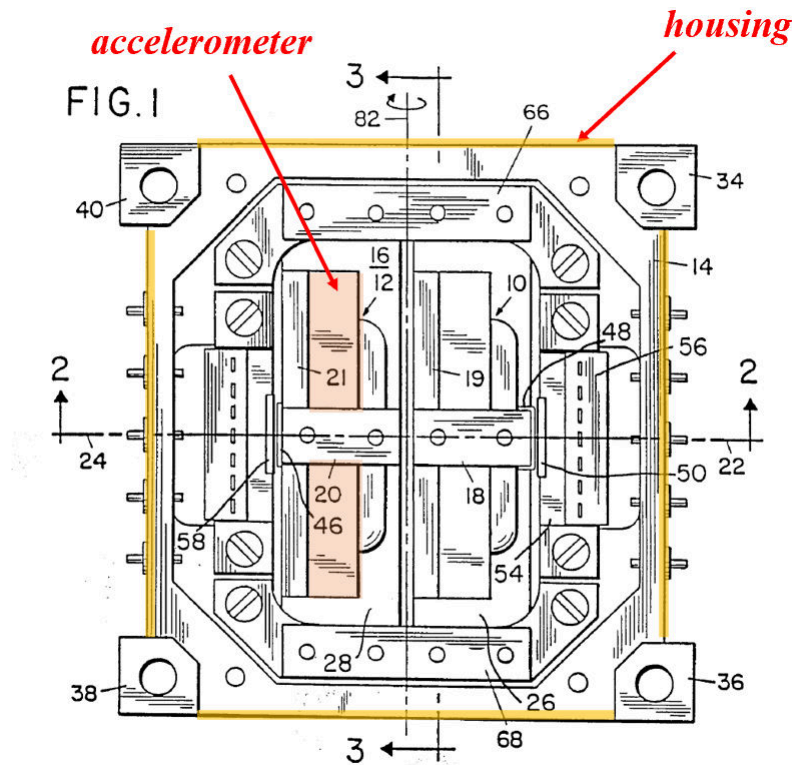
a) Claim 1

[1pre]

See [1pre] (Ground 1A). APPLE-1003, ¶¶254, 126-128; §IV.A.4.[1pre].

[1a]

Murakoshi-Stewart-Sachs-Orr provides an apparatus implemented with the accelerometer positioned within a casing, per Stewart. APPLE-1006, 5:8-9, Fig. 1; APPLE-1003, ¶¶255-259; §§IV.A.3, IV.C.2.



APPLE-1006, Fig. 1 (annotated)

Murakoshi discloses an apparatus coupled to a vibratory (mounting) surface. APPLE-1004, [0021]. “[A]pparatus 104 may be fixed above and/or below the table top.” *Id.*, [0021]. Under Apple’s construction (§III), the Murakoshi-Stewart-Sachs-Orr apparatus is coupled to the top of the vibratory (mounting) surface. APPLE-1003, ¶¶255-258. In modified Figure 1, below, the apparatus (orange) is positioned on the vibratory surface (blue). APPLE-1003, ¶258.

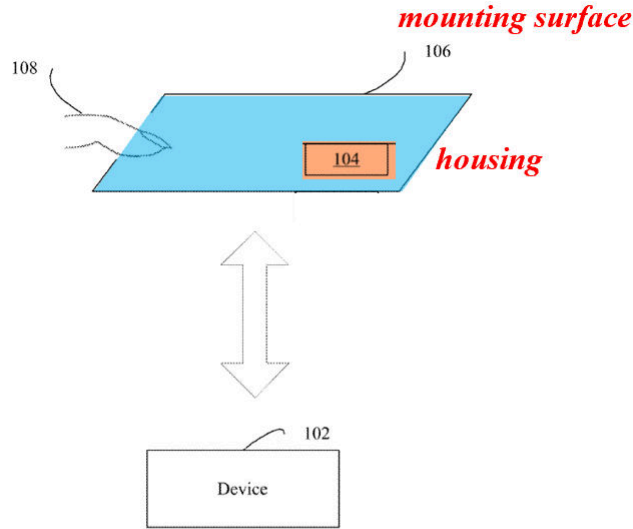
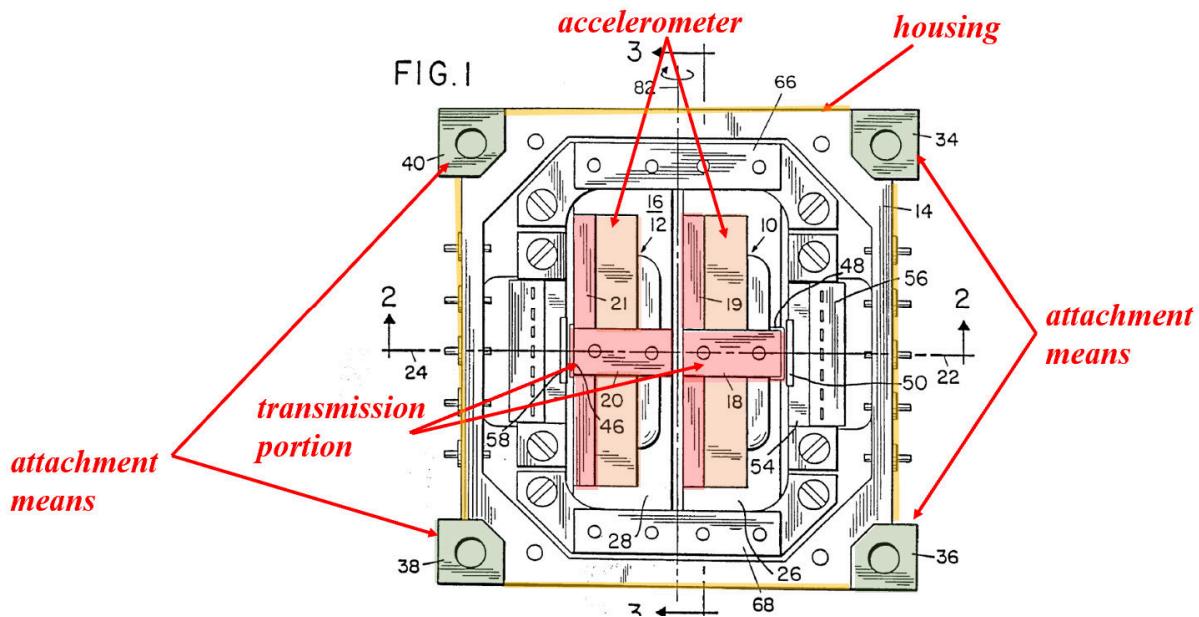


FIG. 1

APPLE-1004, Fig. 1 (annotated; modified)⁷

Applying Apple’s construction (§III), Murakoshi-Stewart-Sachs-Orr renders obvious an “engagement means” based on Stewart’s teachings of (1) case mounts for use with mechanical fasteners and (2) a bracket assembly. APPLE-1006, 5:8-9, 5:34-37, Fig. 1; APPLE-1003, ¶¶255-259. A detailed §112(f) analysis for the “engagement means” element is provided in [1e].

⁷ Murakoshi’s Fig. 1 has been modified to illustrate the housing coupled to a top surface of the mounting surface, consistent with Apple’s construction (§III); modified Fig. 1 is used throughout Ground 1C unless otherwise stated.



APPLE-1006, Fig. 1 (annotated)

[1b-i]

See [1b-i] (Ground 1A). APPLE-1003, ¶¶260, 132-133; §IV.A.4.[1b-i].

[1b-ii]

As described in Ground 1A, Murakoshi discloses the sensor detects vibrations of a vibratory (mounting) surface within “a pre-defined region” (interactive zone), and “a user may *interact at any location within the pre-defined region* of the vibratory surface 106 to control the user interface of the device.” §IV.A.4.[1b-ii]; APPLE-1004, [0034], *see id.*, [0021], [0013], [0016], Fig. 1; APPLE-1003, ¶¶261-262, 134-135.

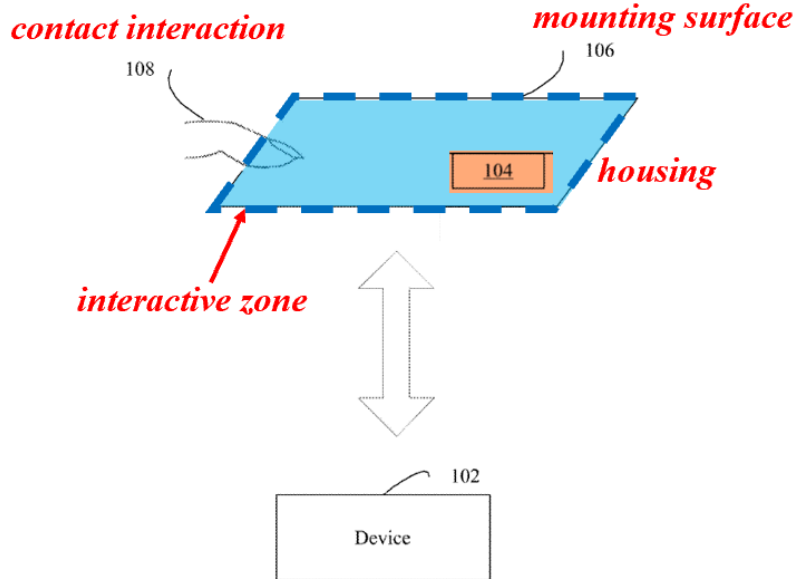


FIG. 1

APPLE-1004, Fig. 1 (annotated; modified)

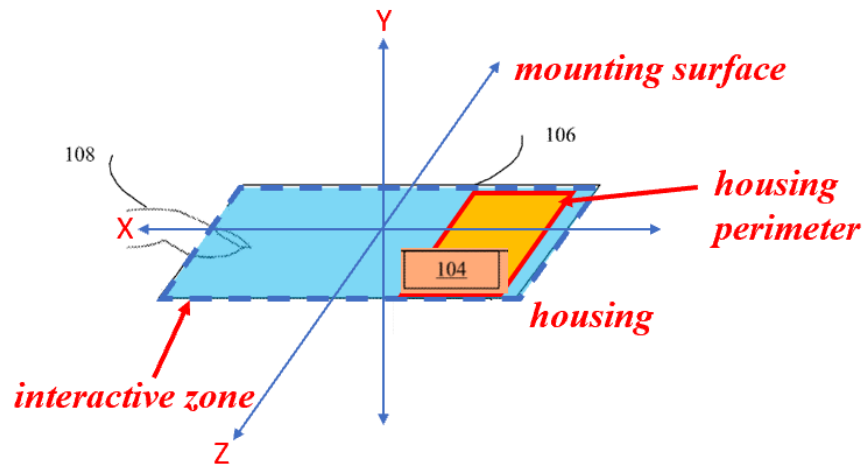
A POSITA would have understood that the pre-defined region of the vibratory surface, per Murakoshi, defines a zone within the sensor's range so a user's interactions with the surface within the pre-defined zone can be detected by the sensor and used to control device, even when the sensor is positioned on top of the surface, as Murakoshi teaches is an acceptable placement. APPLE-1004, [0034]; APPLE-1003, ¶¶261-262.

[1b-iii]

See [1b-iii] (Ground 1A). APPLE-1003, ¶¶263, 136; §IV.A.4.[1b-iii].

[1b-iv]

Because, in Murakoshi, a “pre-defined region of a surface may correspond to the vibratory surface,” the pre-defined region extends in an X-Z plane and is formed on the surface (also an X-Z plane) and thus is aligned with the vibratory surface and also overlays the vibratory surface because both the pre-defined region and surface occupy the same X-Z plane. APPLE-1004, [0029], [0016], [0021]; APPLE-1003, ¶¶264-265.



APPLE-1004, Fig. 1 (annotated; modified)

Additionally, Fig. 1 illustrates that the “pre-defined region” (interactive zone) extends outside the perimeter of the apparatus’s housing, whether the apparatus is above or below the surface. APPLE-1004, [0016], Fig. 1; APPLE-1003, ¶265.

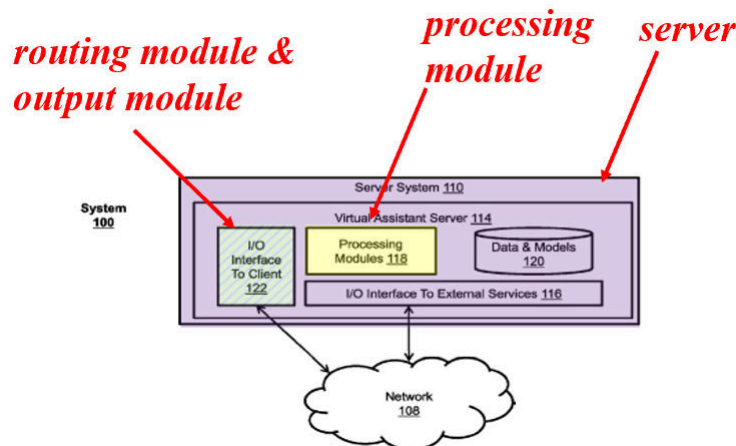
[1b-v]-[1b-viii]

See [1b-v]-[1b-viii] (Ground 1A). APPLE-1003, ¶¶266-270, 141-148, 39-

43; §IV.A.4.[1b-v]-[1b-viii].

[1c-i]

Consistent with the '738 patent's discussion of a "server" (*see e.g.*, APPLE-1001, 5:22-28, 7:24-25, 9:35-43, Fig. 1), Murakoshi-Stewart-Sachs-Orr renders obvious "a server in communication with a sensor" based on Murakoshi-Stewart-Sachs-Orr's processing of the vibratory signals detected by the sensor at a cloud-based server, per Orr. APPLE-1004, [0018], [0013], [0016], [0025], Fig. 2; APPLE-1005, [0005], [0027]; APPLE-1003, ¶¶271-272.



APPLE-1005, Fig. 1 (annotated; excerpted)

As illustrated in Fig. 1 above, and described further below, the server, per Murakoshi-Stewart-Sachs-Orr, includes a routing, processing and output modules. APPLE-1003, .

[1c-ii]

Applying Apple's construction (§III), Murakoshi-Stewart-Sachs-Orr

renders obvious a “routing module” based on Orr’s disclosure of an I/O interface that routes and receives data signals from the sensor (see Fig. 1, above). APPLE-1004, [0032], [0018], [0025]; APPLE-1005, [0028], [0051]-[0052]; APPLE-1003, ¶273. A detailed §112(f) analysis for the “routing module” element is provided below for [1c-v].

[1c-iii]

Applying Apple’s construction (§III), Murakoshi-Stewart-Sachs-Orr renders obvious a “processing module” based on Orr’s disclosure of a processing module connected to the I/O interface (routing module) (see Fig. 1, above). APPLE-1004, [0013], [0023], [0025], [0027], [0036], [0048]; APPLE-1005, [0028], [0056], [0081], [0091]-[0092], Figs. 7-9; APPLE-1003, ¶274. A detailed §112(f) analysis for the “processing module” element is provided below in [1c-vi].

[1c-iv]

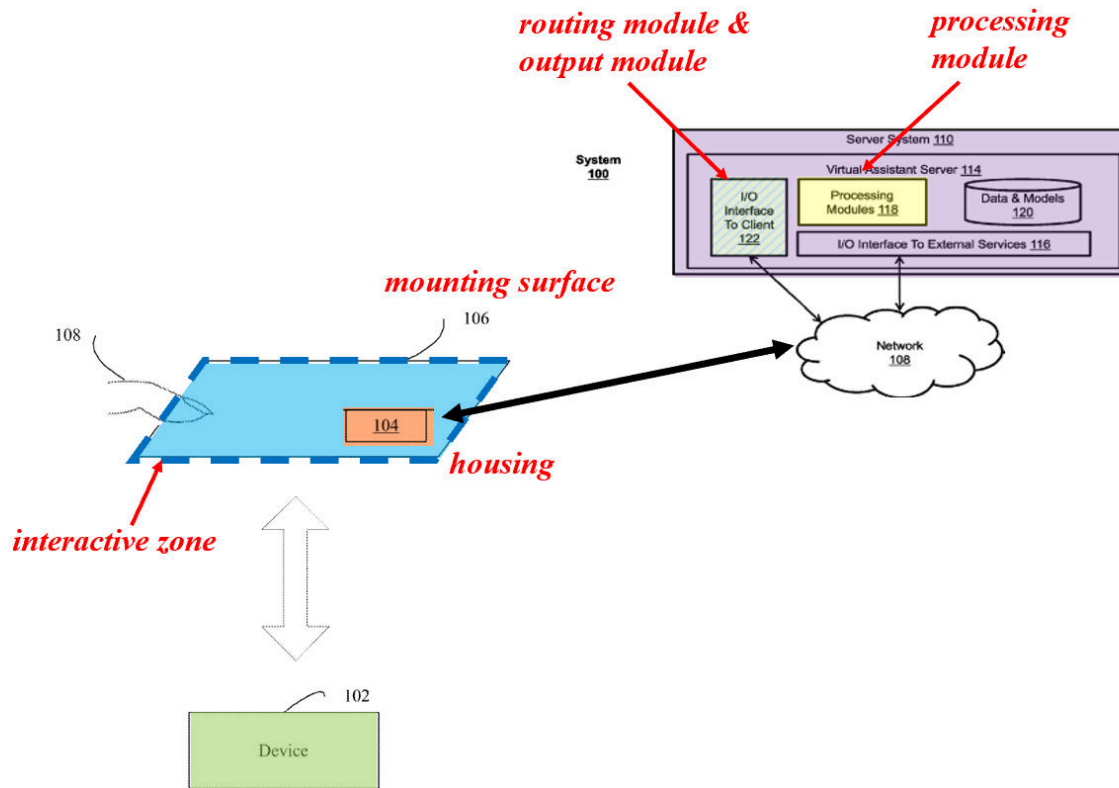
Applying Apple’s construction (§III), Murakoshi-Stewart-Sachs-Orr renders obvious an “output module” based on Orr’s disclosure of an I/O interface, which a POSITA would have understood acts as a transmitter, per Murakoshi, and is connected to the processing module (see Fig. 1, above). APPLE-1004, [0026], [0048]; APPLE-1005, [0028], [0049], [0062], [0056], [0081], [0091]-[0092], Figs. 7-9; APPLE-1003, ¶275. A detailed §112(f) analysis for the “output module” element is provided below in [1d-v].

[1c-v]

Applying Apple's construction (§III), Murakoshi-Stewart-Sachs-Orr provides a server with an I/O interface, per Orr, that a POSITA would have understood functions as a receiver to receive data signals from the sensor and route the signals to the processing module. §IV.C.3[1c-ii]; APPLE-1005, [0028], [0051]-[0052]; APPLE-1004, [0032], [0062]; APPLE-1003, ¶¶276-280.

Orr describes a server includes “client-facing I/O interface 122” to “facilitate the client-facing input and output processing for virtual assistant server” (APPLE-1005, [0028]) and “data corresponding to the audio input transmitted by the user device ... can be received by one or more servers.” APPLE-1005, [0052]. From Orr's disclosure, a POSITA would have understood that data is received at the server through the I/O interface. APPLE-1003, ¶¶277-278.

A POSITA would have understood the I/O interface functions as a receiver from Murakoshi's disclosure of a receiver which “comprise[s] suitable logic, circuitry, interfaces, and/or code that may be operable to receive data and messages” and “may receive the vibratory signal generated by the sensor 206 external to the apparatus 104.” APPLE-1004, [0032], [0018], [0025]. A POSITA would have understood that the I/O interface, per Orr, functions as a receiver in Murakoshi-Stewart-Sachs-Orr. APPLE-1003, ¶¶279-280.



APPLE-1004, Fig. 1 (annotated; modified with APPLE-1005, Fig. 1)

In Murakoshi-Stewart-Sachs-Orr, the I/O interface receives the vibratory signals from the accelerometer and transfers the signals to the processing module for processing. APPLE-1003, ¶¶277-280. A POSITA would have understood the signals received at the I/O interface from the accelerometer would be routed within the server to the processing module based on Murakoshi and Orr's descriptions that after the signals are received, the signals are processed. APPLE-1003, ¶280. Accordingly, Murakoshi-Stewart-Sachs-Orr renders obvious a "routing module" by providing a receiving portion of an I/O interface (an equivalent of a routing module) which performs the claimed function. APPLE-

1003, ¶¶276-280.

[1c-vi]

Applying Apple’s construction (§III), Murakoshi-Stewart-Sachs-Orr renders [1c-vi] obvious based on Orr’s disclosure of a processing module which a POSITA would have understood in Murakoshi-Stewart-Sachs-Orr includes logic and circuitry that performs several processing steps described by Murakoshi to determine a data pattern (i.e., identifying “vibratory signal components”) corresponding to the data signals and matches the data pattern with a gesture profile (i.e., identifying and generating a “control signal corresponding the one or more generated vibratory signals”). APPLE-1004, [0038]; APPLE-1005, [0028], [0056]; §IV.C.3.[1c-iii]; APPLE-1003, ¶¶281-285.

Murakoshi describes that, after detection of the vibrations (data signals), the apparatus may “generate one or more vibratory signals in response to the detected one or more vibrations” and the processor (processing module) is then able to “generate a control signal corresponding to the one or more generated vibratory signals to control the user interface of the device.” APPLE-1004, [0013]. The processing module “convert[s] each of the generated one or more vibratory signals into vibratory signal components,” and a POSITA would have understood that, in the combination, vibratory signal components, per Murakoshi, form a data pattern determined by the processing module, as Orr teaches. APPLE-1004, [0038];

compare with APPLE-1001, 5:5-8 (data pattern is defined by data including peaks and timings); APPLE-1003, ¶¶281-283. For example, Murakoshi describes determining a vibration frequency associated with interaction of an object with the vibratory surface. APPLE-1004, [0015], [0028], [0042]-[0044]; APPLE-1003, ¶283.

Additionally, Murakoshi-Stewart-Sachs-Orr’s processing module uses the vibratory signal components, including the data features taught by Sachs, as a data pattern for identification of a corresponding control signal. APPLE-1004, [0015], [0023], [0025], [0027], [0036], [0048]; APPLE-1007, [0009]-[0010], [0015], [0101]; APPLE-1003, ¶284. A POSITA would have understood from Murakoshi and Sachs that, in Murakoshi-Stewart-Sachs-Orr, the processor determines data features (data pattern) and matches the data pattern to stored mappings of data features to corresponding operations (commands) to identify a control signal—a gesture profile associated with a command. APPLE-1004, [0048]; APPLE-1003, ¶¶284-285. Accordingly, Murakoshi-Stewart-Sachs-Orr renders obvious a “processing module” by disclosing a processing module of a server which performs the claimed function. APPLE-1003, ¶¶281-285.

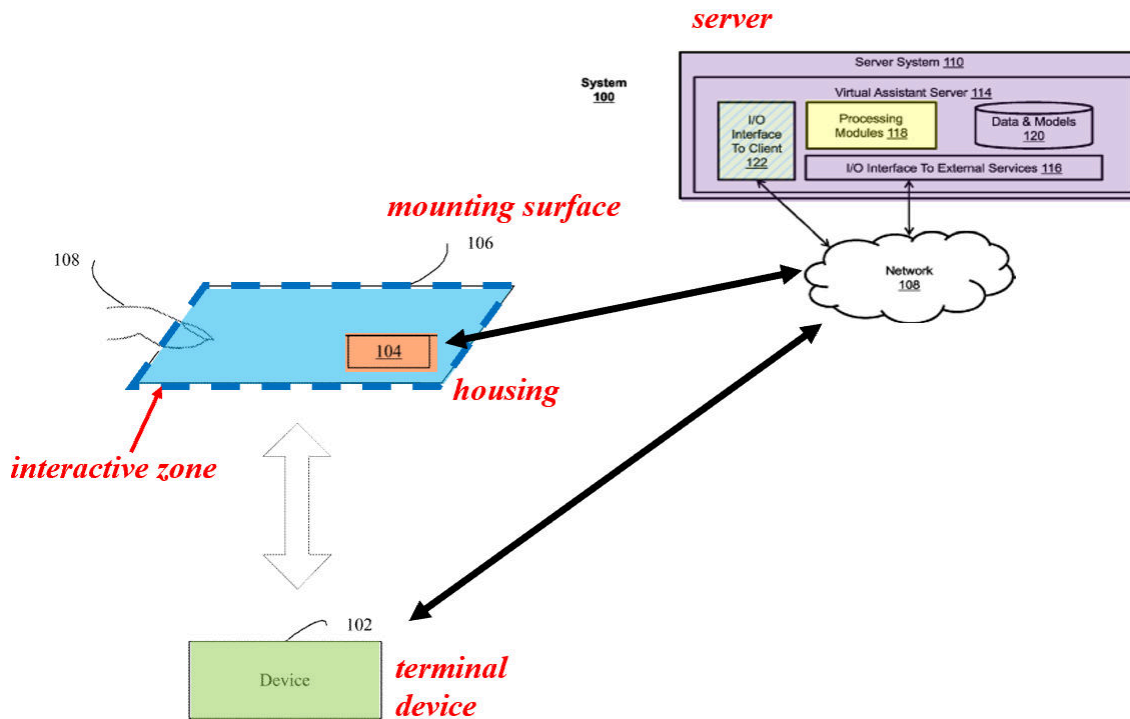
[1d-i]-[1d-iii]

The mappings of [1d-i]-[1d-iii] described in Ground 1A meet Apple’s construction (§III), so Murakoshi-Stewart-Sachs-Orr renders obvious [1d-i]-[1d-

iii] for the same reasons. APPLE-1003, ¶¶286-289, 160-165. A detailed §112(f) analysis for “receiving module” is provided in [1d-v].

[1d-iv]

In Murakoshi-Stewart-Sachs-Orr, the server processes the vibratory signal to generate a control signal, per Orr, and the terminal device is in communication with the server to receive the control signal. §IV.C.2; APPLE-1003, ¶290; APPLE-1004, [0016], [0018], [0023], [0048], [0093].



APPLE-1004, Fig. 1 (modified with APPLE-1005, Fig. 1)

A POSITA would have understood that the terminal device is communicatively coupled to the server in Murakoshi-Stewart-Sachs-Orr. APPLE-1003, ¶290.

[1d-v]

Applying Apple’s construction (§III), Murakoshi-Stewart-Sachs-Orr renders [1d-v] obvious at least because Orr discloses an I/O interface which a POSITA would have understood is connected to the processor and acts to output and transmit a command to the terminal device. §IV.C.3.[1c-iv]; APPLE-1003, ¶¶291-293; APPLE-1004, [0026], [0048], [0033]; APPLE-1005, [0028], [0049], [0062].

Additionally, Murakoshi-Stewart-Sachs-Orr provides a receiving module at least because the terminal device includes “processors and/or circuits” “operable to receive a control signal from the apparatus,” per Murakoshi. APPLE-1004, [0093]; APPLE-1003, ¶¶294-295. A POSITA would have understood that “processors and/or circuits” of a terminal device which “receive a control signal” are equivalents of the claimed receiving module and accomplish the same function—receiving the command from the output module (i.e., I/O interface transmitter). APPLE-1003, ¶¶294-295.

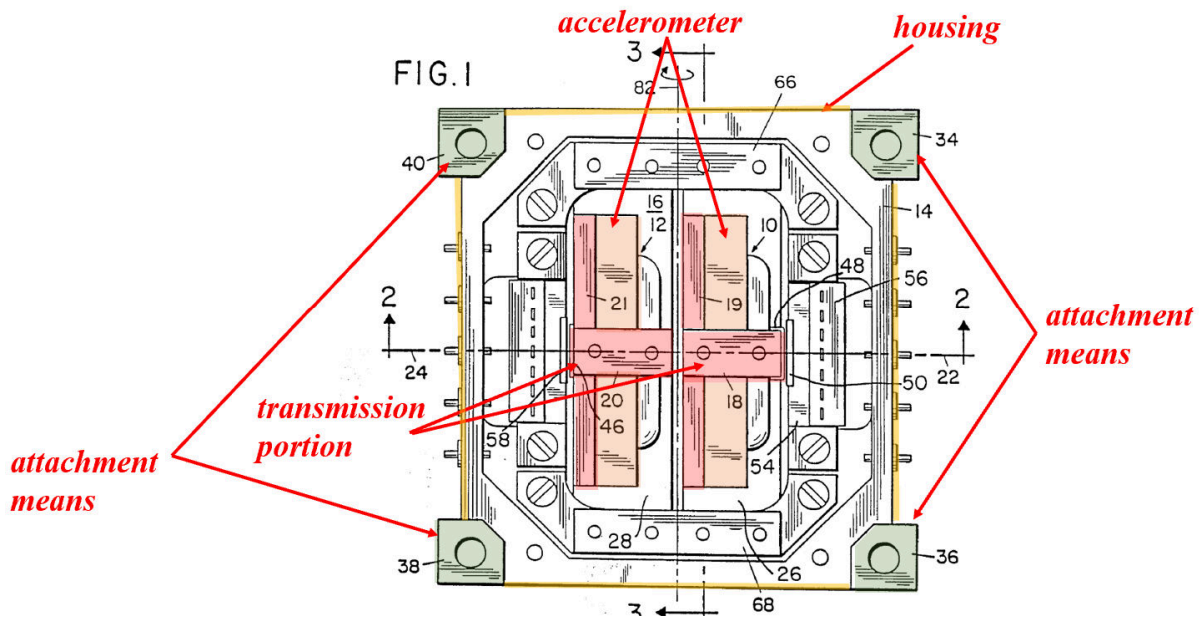
Accordingly, a POSITA would have understood the I/O interface, per Orr, functions as a transmitter (output module) to transmit the control signal from the server to the terminal device. APPLE-1005, [0028], [0062], [0049], Fig. 1; APPLE-1004, [0023], [0050], [0093]; APPLE-1003, ¶295. A POSITA would have further understood that the terminal device’s “processors and/or circuits”

(receiving module) receives the control signal from the I/O transmitter of the server. APPLE-1004, [0093], [0023], [0050], [0033]; APPLE-1003, ¶¶291-295.

[1e]

Under Apple’s construction (§III), Murakoshi-Stewart-Sachs-Orr renders [1e] obvious based on Stewart’s disclosure that the apparatus casing is attached to a mounting surface using case mounts and mechanical fasteners (“attachment means”), and the accelerometer is attached within the housing (and to the case mounts) by a bracket assembly, that connects the sensor to the attachment means of the housing, sets a rigid position of the sensor relative to the mounting surface, and transmits data signals from the attachment means to the sensor (“transmission portion”). APPLE-1006, 5:8-37, 5:54-61, Fig. 1; APPLE-1004, [0013], [0020], [0023], [0029]-[0030], [0036]; APPLE-1003, ¶¶296-306.

It would have been obvious to a POSITA that case mounts, per Stewart, would have been used with a mechanical fastener (e.g., bolt, screw) to attach the casing/housing to a mounting surface, as Murakoshi directs. APPLE-1004, [0021]; APPLE-1003, ¶¶296-298, 39-43. Murakoshi-Stewart-Sachs-Orr renders obvious an “attachment means” based on Stewart’s disclosure that the casing includes case mounts that would be used with mechanical fasteners to attach the housing to the mounting surface. APPLE-1005, 5:34-37; APPLE-1004, [0021]; APPLE-1003, ¶¶298-299.



APPLE-1006, Fig. 1 (annotated)

Additionally, Stewart describes that “[a]ccelerometer 10 is attached to a *three-part bracket assembly* that includes the finger 18 and the beam 19.”

APPLE-1006, 5:9-11. Further, Stewart describes that the accelerometer is held between sidewalls by spaced fingers and sidebeams that extend the length of the cavity, which allows the accelerometer to vibrate within the casing. APPLE-1006, 5:54-61. Accordingly, Murakoshi-Stewart-Sachs-Orr renders obvious a “transmission portion” based on the disclosure that its accelerometer is connected to the case mounts and fasteners (attachment means) of the casing by a bracket assembly, per Stewart. APPLE-1003, ¶¶300-301. Collectively, the three-part bracket assembly and case mounts with mechanical fasteners couple a sensor to the housing and the housing to a mounting surface. APPLE-1003, ¶301.

In Murakoshi-Stewart-Sachs-Orr, the accelerometer is protected and held in a position within the casing by a bracket assembly, per Stewart, to sense vibrations efficiently, without interference. APPLE-1006, 5:8-20, 5:54-61; APPLE-1003, ¶¶302-306. A POSITA would have understood that the bracket assembly's composition and structure would have different specifications (e.g., material, thickness, flexibility) than Murakoshi's vibratory surface (e.g., a tabletop). APPLE-1004, [0020], [0030], [0023]; APPLE-1003, ¶303. Further, as described, a POSITA would have understood that the brackets, support flexures, and casing, per Stewart, hold the sensor rigidly in place relative to the attachment means, and thus also hold the Murakoshi-Stewart-Sachs-Orr sensor in a rigid position relative to the vibratory surface. *Supra* §IV.C.3.[1b-v]; APPLE-1006, 5:8-33, 5:54-6; APPLE-1003, ¶¶302-304. A POSITA would have understood that the sensor would be held in a fixed position relative to the measured surface to have a fixed reference point for detection of vibratory signals and processing of those signals in a meaningful way. APPLE-1003, ¶¶302-304.

Regardless of the exact bounds of "said contact interaction generating said data signals of said sensor through said transmission portion," Murakoshi-Stewart-Sachs-Orr includes at least the '738 patent's preferred embodiment: "[t]he contact interaction 60 is detected as data signals 70 by the sensor 30" (APPLE-1001, 10:57-59). Similarly, Murakoshi-Stewart-Sachs-Orr's contact interaction (a

tap/scratch on the vibratory surface) is detected as data signals (vibratory signals) by the sensor. APPLE-1003, ¶¶305-306; APPLE-1004, [0020], [0023], [0029]-[0030], [0036]; APPLE-1006, 5:8-20, 5:54-6:1; *see* [1a], [1b-vi].

Murakoshi discloses, “in response to the interaction of the object 108 with the vibratory surface 106, the sensor 206 may sense vibrations generated in the vibratory surface 106.” APPLE-1004, [0013], [0029], [0036]. Stewart discloses an accelerometer includes an inertial mass member “positioned and suspended to react to and to provide a signal that is a measure of acceleration of the supporting structure along a predetermined axis.” APPLE-1006, 6:20-32. From Murakoshi and Stewart, a POSITA would have understood that vibrations (data signals) associated with a user’s tapping on the vibratory surface (contact interaction) are transmitted to the accelerometer through the bracket assembly(transmission portion). APPLE-1003, ¶¶305-306.

b) Claim 10

[10pre]-[10k-i]

See [1p]-[1e] (Ground 1C). *Supra* §IV.C.3.[1p]-[1e]; APPLE-1003, ¶¶307, 254-306.

[10k-ii]-[10l]

See [10k-ii]-[10l] (Ground 1A). *Supra* §IV.A.4.[10k-ii]-[10l]; APPLE-1003, ¶¶308-310, 192-195.

c) Claims 2, 8-9, 11

See claims 2, 8-9 and 11 (Grounds 1A-1B). *Supra* §IV.A.4.[2], [8], [9] and IV.B.3.[11]; APPLE-1003, ¶¶311, 181-187, 232.

d) Claims 4-5

See claims 4-5 (Ground 1B). *Supra* §IV.B.3.[4]-[5]; APPLE-1003, ¶¶220-230. Under Apple’s construction (§III), in Murakoshi-Stewart-Sachs-Orr, the vibratory signal processing, including additional processing details per Sachs, occurs at the server, per Orr. APPLE-1003, ¶312; §IV.C.2.

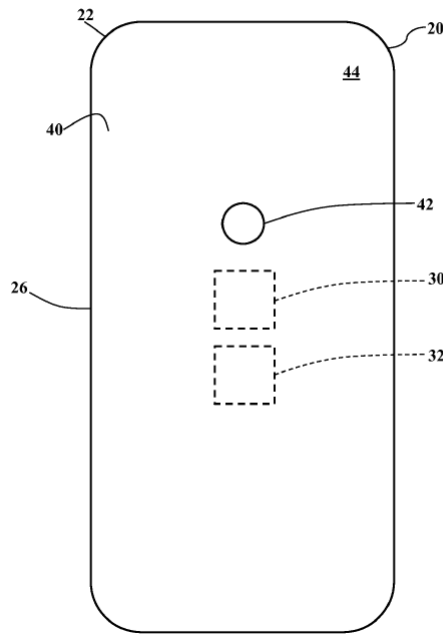
D. GROUND 2A: LI-iFIXIT

Grounds 2A-B present a challenge to claims 1-2, 4-5, and 8-11 based on the Li-iFixit combination that mirrors Haptic’s infringement contentions and constructions. *See* APPLE-1101 (Preliminary Infringement Contentions) and APPLE-1107 (Joint Claim Construction).

1. Li

Li describes “an electronic device” including “a gesture detector 42 [that] detects physical gestures that are made on an outer surface 44 of the body.” APPLE-1008, [0020]; APPLE-1003, ¶¶314-318. A processor interprets signals associated with these gestures “to control the electronic device.” APPLE-1008, [0020].

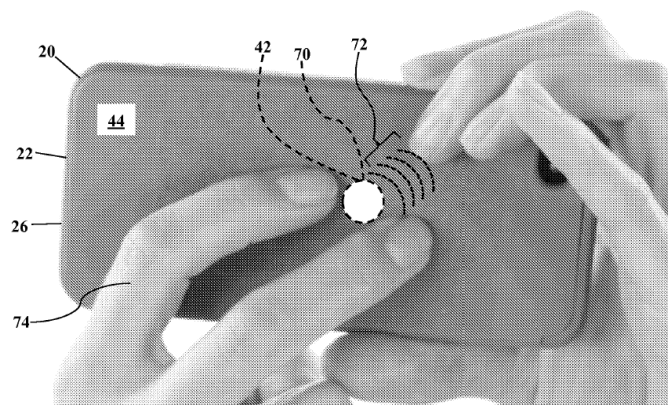
FIG. 2



APPLE-1008, Fig. 2

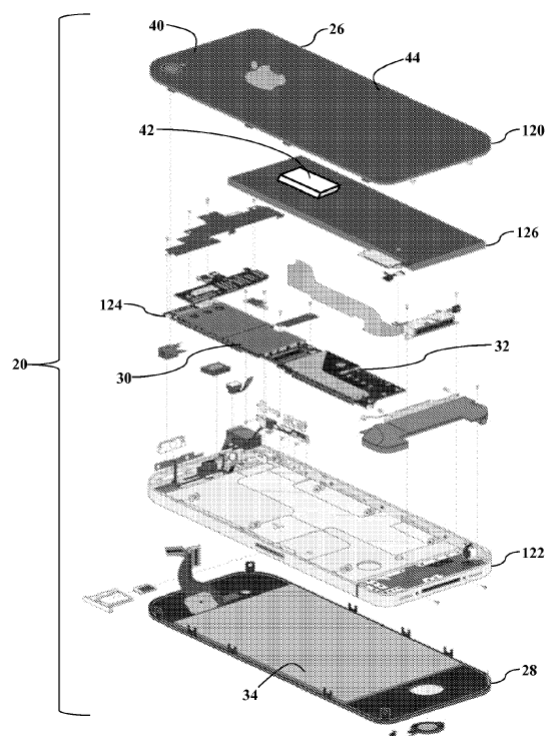
“As the user draws and/or taps the gesture 74 on the outer surface 44 of the body 26, vibration waves travel through or along the outer surface 44 of the body 26 [and the gesture detector’s] piezoelectric transducer 70 senses the vibration.” *Id.*, [0023], [0033].

FIG. 4



APPLE-1008, Fig. 4

FIG. 15



APPLE-1008, Fig. 15

After the gesture detector senses the vibrations, “[t]he processor ... executes a gesture algorithm 50 stored in the memory 32 [which] includes instructions, code, and/or programs that cause the processor 30 to interpret any gesture input sensed by the gesture detector.” *Id.*, [0022]. “The processor 30 compares the output signal 52 to the entries stored in the database 54 of gestures” and “[s]hould a match be found, the processor 30 retrieves the corresponding command.” *Id.*

2. The iFixit Report⁸

a) The Report is a prior art printed publication

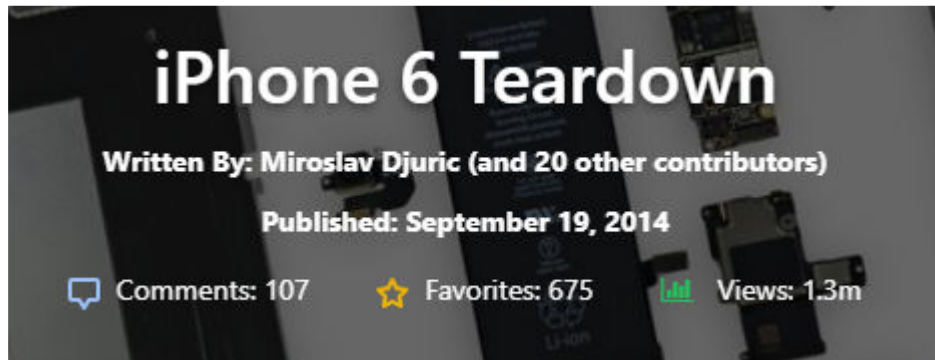
The Report (APPLE-1010) was generally available and known to the relevant technical community before the Critical Date. APPLE-1003, ¶¶319-327; APPLE-1031, 1, 15-19, 25-26, 45; APPLE-1056. It is a prior art printed publication because, before the Critical Date, it was “disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence, can locate it.” *SRI Int’l, Inc. v. Internet Sec. Sys., Inc.*, 511 F.3d 1186, 1194 (Fed. Cir. 2008).

iFixit’s publications were disseminated to the public interested in

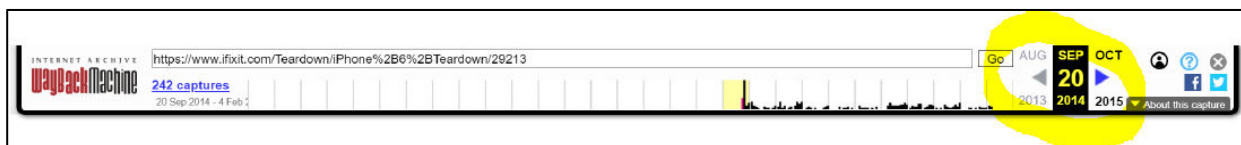
⁸ iFixit (APPLE-1010) is referred to as “the Report” in §IV.D.2.a to distinguish it from the iFixit website.

maintaining/repairing/enhancing electronics and locatable by such interested public. APPLE-1003, ¶¶319-327; *SRI*, 511 F.3d, 1196; *Valve Corp. v. Ironburg Inventions Ltd.* 8 F.4th 1364, 1374 (Fed. Cir. 2021). As explained below, interested persons could locate the Report because it was indexed on iFixit's website, accessible through search engines, and linked to other websites.

The current version of the Report published on the iFixit website which states it “Published: September 19, 2014,” which the archived version (APPLE-1011) corroborates. APPLE-1003, ¶321; APPLE-1031, 1, 45-46; APPLE-1011; *see also* APPLE-1010, APPLE-1011, APPLE-1032, APPLE-1027.



<https://web.archive.org/web/20140920142624/https://www.ifixit.com/Teardown/iPhone+6+Teardown/29213>



Accordingly, the Report was made available to interested persons as of at least September 2014. *See SRI*, 511 F.3d, 1196.

By the Critical Date, iFixit was a well-known website that sold parts and

published free electronic repairing guides. APPLE-1003, ¶¶322 (explaining that Dr. Bederson received emails about iFixit pre-Critical Date). Given the ubiquity of the iFixit website and mentions of its teardown reports by well-known news sources, a POSITA would have been familiar with iFixit and its teardown reports by the Critical Date. APPLE-1003, ¶¶322-324 (citing APPLE-1013 to APPLE-1029, APPLE-1031) (describing iFixit’s popularity and Report-related websites).

The Report was freely available and widely disseminated via iFixit’s website. *See Cordis Corp. v. Boston Scientific Corp.*, 561 F.3d 1319, 1333 (Fed. Cir. 2009); *see* APPLE-1013 to APPLE-1028; APPLE-1032, 1; APPLE-1003, ¶325.

On September 24, 2014, a POSITA could have easily navigated to the Report because the iFixit.com homepage included a link to it (APPLE-1032), and the iPhone 6 Plus Teardown also linked to “the normal-sized iPhone 6 teardown” (APPLE-1033). An interested party could navigate to the Report via articles published around September 2014 that discussed and linked to the Report. APPLE-1003, ¶¶326-327 (citing APPLE-1013; APPLE-1017 to APPLE-1020; APPLE-1022 to APPLE-1024). Accordingly, a POSITA would have known of the Report and would have been able to locate and access the Report via easily navigable pathways. APPLE-1003, ¶¶319-327; *SRI*, 511 F.3d, 1196.

The Declaration of Mr. Wiens, CEO of iFixit, and attached appendices,

support the finding that the Report is a printed publication. *See* APPLE-1056.

Mr. Wiens confirms that the report was freely accessible via the main iFixit website through various navigation pathways and from other sites linking to the teardown page. *Id.*, 1. The data analytics for page visits to the Report show a total history of over 270,000 unique page views, with more than 150,000 page views occurring at the publication of the Report in late September 2014. *Id.*, 21. Accordingly, a POSITA would have known of the Report, and would have been able to navigate to the report – as indeed many did. *Id.*

Thus, the Report is a prior art printed publication.

b) iFixit

iFixit describes the internal components of the iPhone 6, illustrating removal of the logic board and identifying components of the logic board and phone. APPLE-1011, 1; APPLE-1003, ¶328.

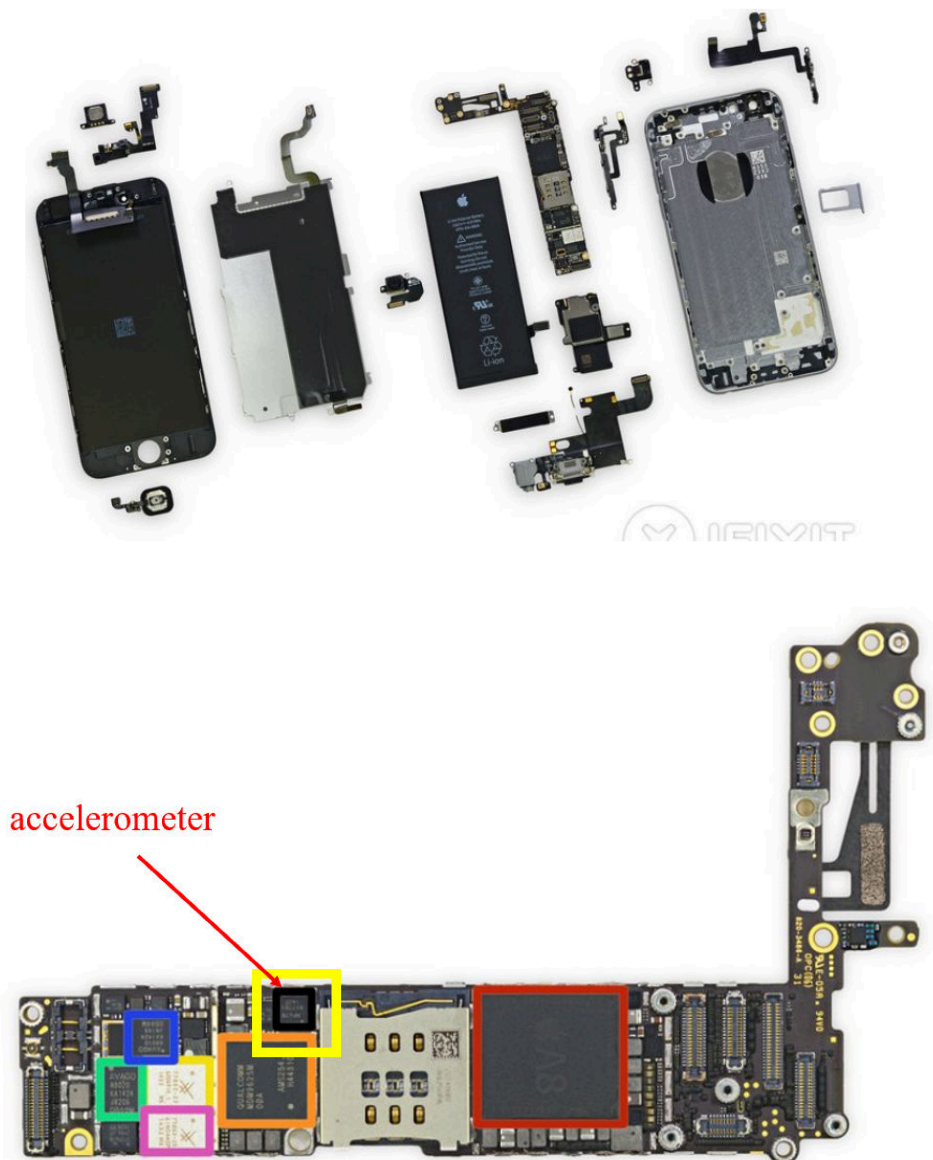
Step 7



APPLE-1011, 4

As shown below, iFixit illustrates structures within the phone (top) and the components on the logic board's front side (bottom), including an "InvenSense

MP67B 6-axis Gyroscope and Accelerometer Combo” (hereinafter,
“Accelerometer/Gyroscope”). APPLE-1011, 6-7, 9-10.



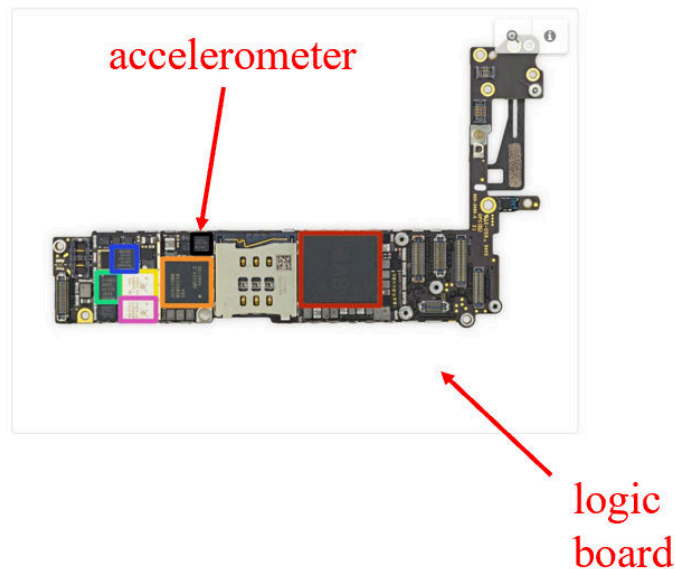
APPLE-1011, 9-10 (top), 6-7 (bottom) (annotated; highlighted)

3. Li-iFixit

In Li-iFixit, Li’s gesture detection methodology is implemented in an

iPhone using internal components of an iPhone identified in iFixit. APPLE-1007, [0019]-[0020], [0033]-[0035], Fig. 15; APPLE-1011, 1, 6-7; APPLE-1003, ¶¶329-337. In Li-iFixit, the iPhone includes an accelerometer mounted on the logic board, which is held in place in the iPhone body by screws, and is used to sense vibrations per Li. APPLE-1011, 6-7, 3-4, 9-10; APPLE-1003, ¶¶329-339, 39-43.

Step 15



APPLE-1011, 6-7

A POSITA would have been motivated to pursue the combination for several reasons.

- A POSITA would have been motivated to look to the components and systems within the iPhone to implement a gesture detection and control system, per Li, because Li illustrates the system using an

iPhone and explicitly states that “[t]he electronic device 20 is illustrated as the popular IPHONE.” APPLE-1008, [0033]; APPLE-1003, ¶340.

- A POSITA would have understood from Li that the gesture detection method could be implemented in different electronic devices, including smartphones like the example iPhone that Li provides and would have been motivated to look to references like iFixit to understand the components of an iPhone to implement gesture detection in an iPhone. *Id.*, [0019]-[0020], [0033]-[0035], Fig. 15; APPLE-1003, ¶341.
- A POSITA would have understood that an accelerometer (e.g., the accelerometer described by iFixit as being present in the iPhone) would have been capable of “sens[ing] the vibration” and “generat[ing] the output signal...in response to the vibration” to achieve gesture detection and control methods, per Li. APPLE-1011, 6-7; APPLE-1008, [0023]; APPLE-1003, ¶¶342, 39-43.
- A POSITA would have understood that using an iPhone’s existing accelerometer and other hardware in the Li-iFixit combination would minimize the phone’s thickness as compared to adding additional components to the phone. APPLE-1003, ¶343.

- A POSITA would have understood that using the existing accelerometer in the iPhone to detect vibrations achieves Li's requirements for the gesture detection method, including a sensor interfacing with a logic board and located close to the iPhone's back to detect taps and gestures on a back surface. APPLE-1008, [0033], Fig. 15; APPLE-1011, 6-7; APPLE-1003, ¶¶344-345.
- A POSITA would have understood that using the hardware in the iPhone, per iFixit, to implement a gesture detection system, per Li, does not require any additional component to be added to the device to detect vibrations. APPLE-1008, [0033], Fig. 15; APPLE-1011, 6-7; APPLE-1003, ¶346.
- A POSITA would have understood that the combination of known elements according to known methods would have yielded predictable results, as each element performs a similar function combined as it does separately, the combination would have been well within a POSITA's skill at least because iFixit describes locations of components within the iPhone already described by Li as part of a gesture detection method. APPLE-1003, ¶¶347, 39-43. Accordingly, a POSITA would have had a reasonable expectation of success in doing so for the reasons explained above. APPLE-1003,

¶347.

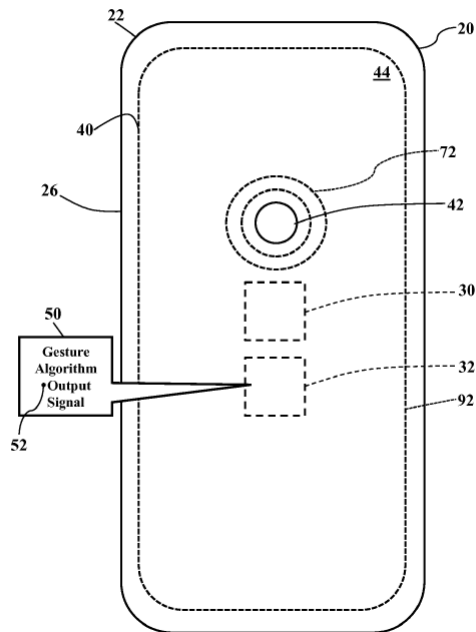
4. Analysis

a) Claim 1

[1pre]

To the extent the preamble is limiting, Li-iFixit discloses a control system including a gesture detection and control system, per Li, implemented in an iPhone, per iFixit. APPLE-1003, ¶348; APPLE-1008, [0019]-[0023], [0033], Fig. 4, 13, 15; APPLE-1011, 1-2. Li explains: “[t]he user may make gestures on the outer surface 44 of the body 26 [of electronic device 20], and the processor interprets those gestures *to control* the electronic device 20.” *Id.*, [0020]; *see id.* [0019], Abstract.

FIG. 13

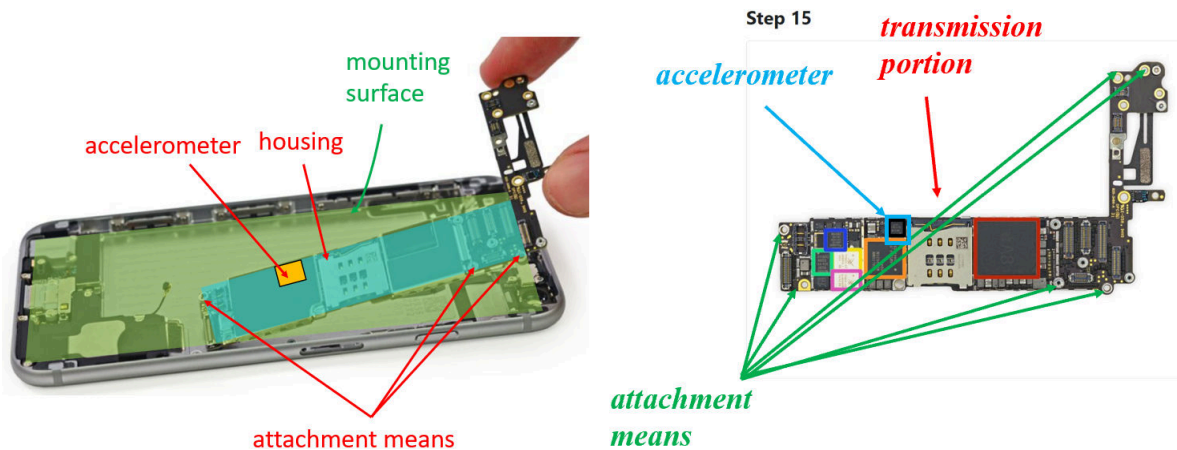


APPLE-1008, Fig. 13

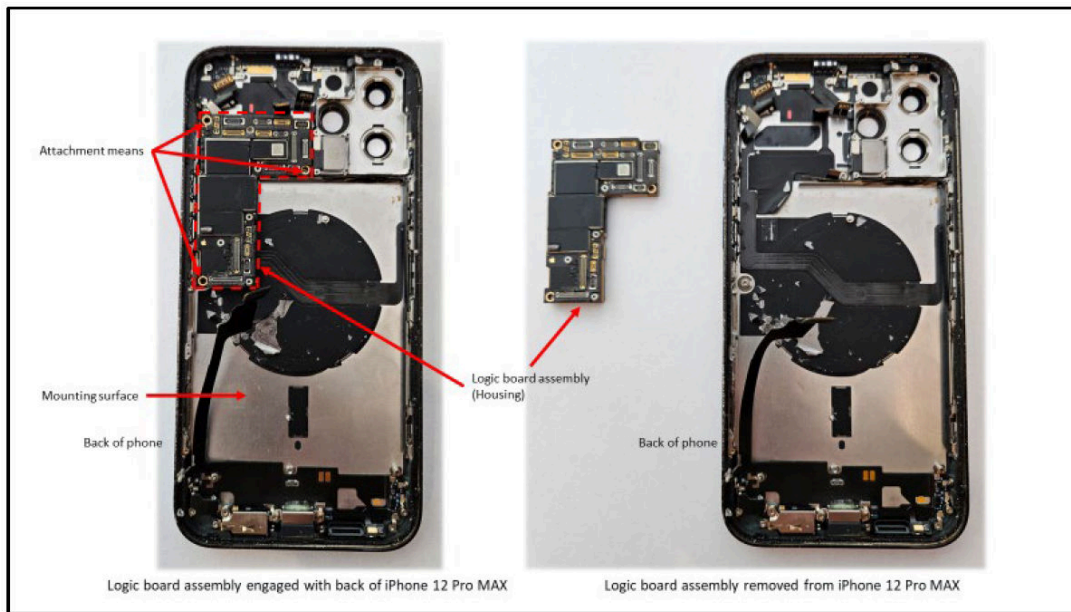
[1a]

Under Haptic’s construction (§III), Li-iFixit renders obvious “engagement means” based on Li-iFixit’s logic board assembly (including at least the printed circuit board and the chips mounted on the logic board assembly) and Li-iFixit’s housing (logic board assembly) coupled to a part of the iPhone that engages with the housing, including an inside surface of the iPhone’s back cover. APPLE-1011, 6-7; APPLE-1008, Fig. 15, [0033]; §III; APPLE-1101, 12, 46; APPLE-1003, ¶¶349-354.

Consistent with Haptic’s construction (§III) as evidenced by Haptic’s infringement contentions, Li-iFixit renders obvious “engagement means” by providing threaded screws/screw holes through the logic board assembly for attaching the logic board assembly within the iPhone. APPLE-1101, 9-12, 33-35, 43-45, 66-68; APPLE-1011, 4, 6-7, 9-10; APPLE-1008, Fig. 15; APPLE-1003, ¶¶350-354. A detailed §112(f) analysis for the “engagement means” element is provided in [1e], which recites additional limitations relating to the “engagement means.”



APPLE-1011, 5 (annotated; modified) (left), 6-7 (annotated) (right)

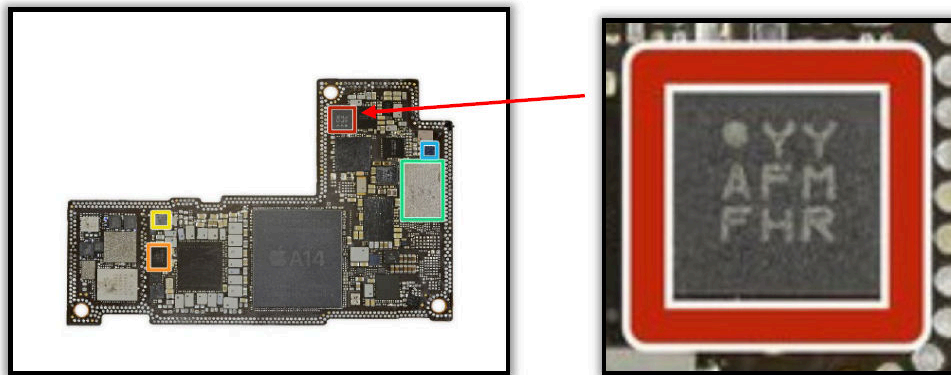
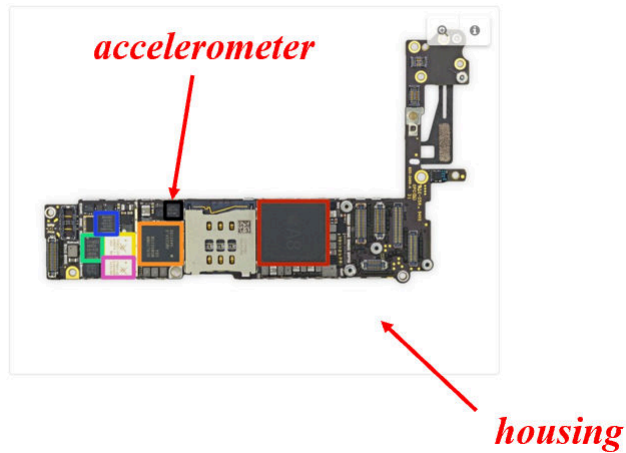


APPLE-1101, 10

[1b-i]

The Li-iFixit combination includes a sensor (Accelerometer/Gyroscope IMU) contained within the housing (positioned on the logic board). APPLE-1008, Fig. 15, [0023], [0033]; APPLE-1011, 6-7; APPLE-1003, ¶¶355-356, 39-43.

Step 15



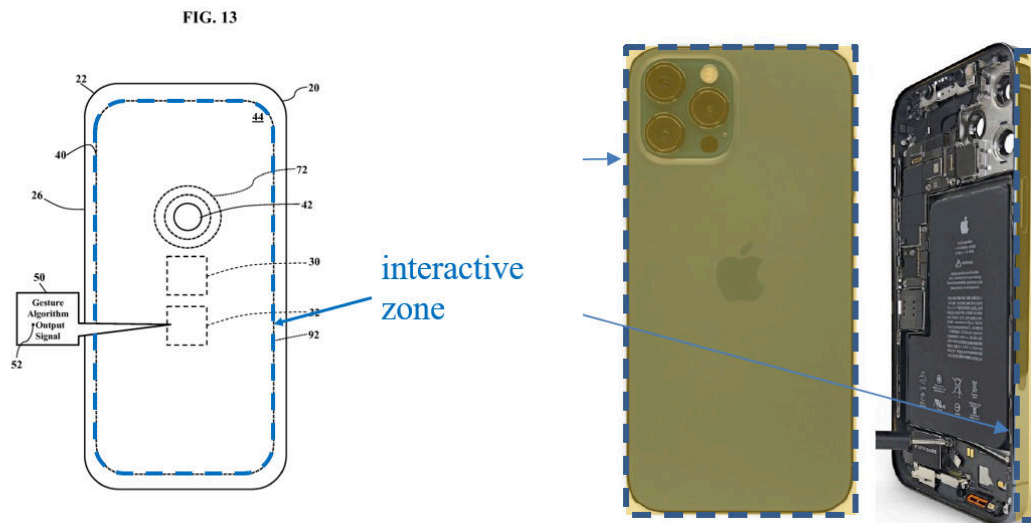
Top: APPLE-1011, 6-7 (annotated)

Bottom: APPLE-1101, 13

[1b-ii]

The Li-iFixit sensor forms a supplemental gesture surface area (interactive zone) defined by the sensor's range. APPLE-1003, ¶357. In Li's gesture detection method, the vibration sensor, implemented using an iPhone accelerometer in Li-iFixit, "detects physical gestures ... made on an outer surface 44 of the body." APPLE-1008, [0020]; APPLE-1003, ¶357. Li further discloses

that “[a]s the backside 40 [of the phone] may present a large, supplemental gesture surface area 92 for inputting gestures, the gesture detector 42 may be disposed in or near the central region 90 to detect the vibration.” APPLE-1008, [0027], [0030]. Accordingly, Li discloses the supplemental gesture surface area (interactive zone) defines a zone in which the sensor detects user gestures as vibrations. APPLE-1003, ¶357.



Left: APPLE-1008, Fig. 13 (annotated); Right: APPLE-1101, 14

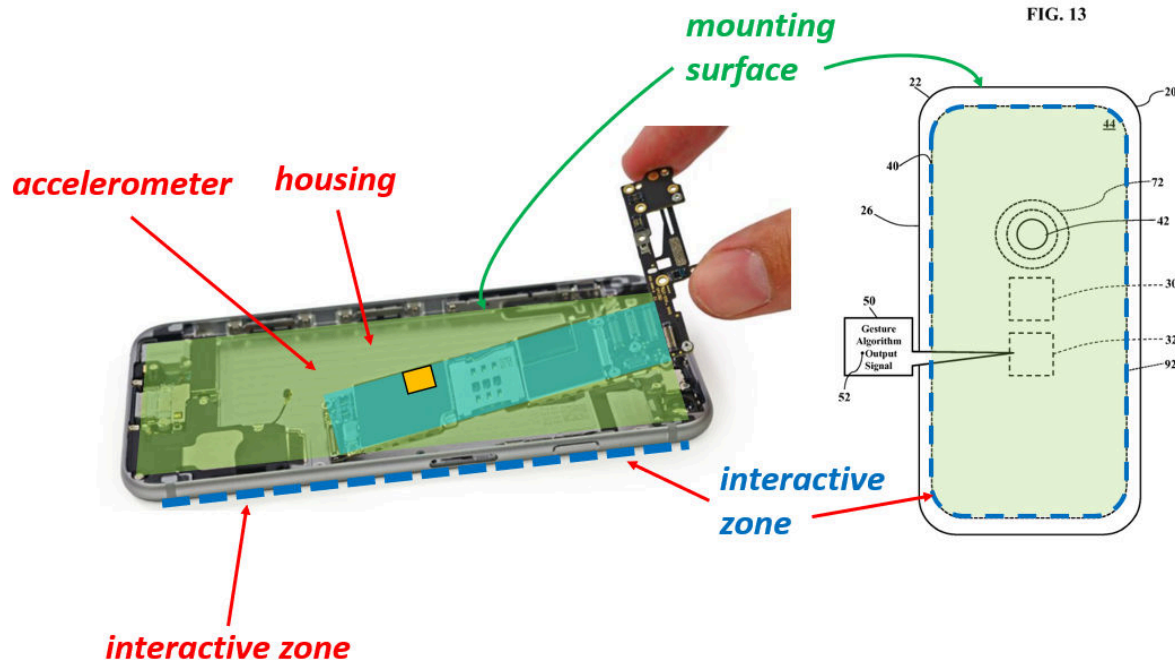
[1b-iii]

Li-iFixit’s sensor comprises an accelerometer. APPLE-1011, 6-7 (“InvenSense MP678 6-axis Gyroscope and *Accelerometer* Combo”); APPLE-1003, ¶¶358, 39-43.

[1b-iv]

Li-iFixit's interactive zone (supplemental gesture surface area 92) is aligned

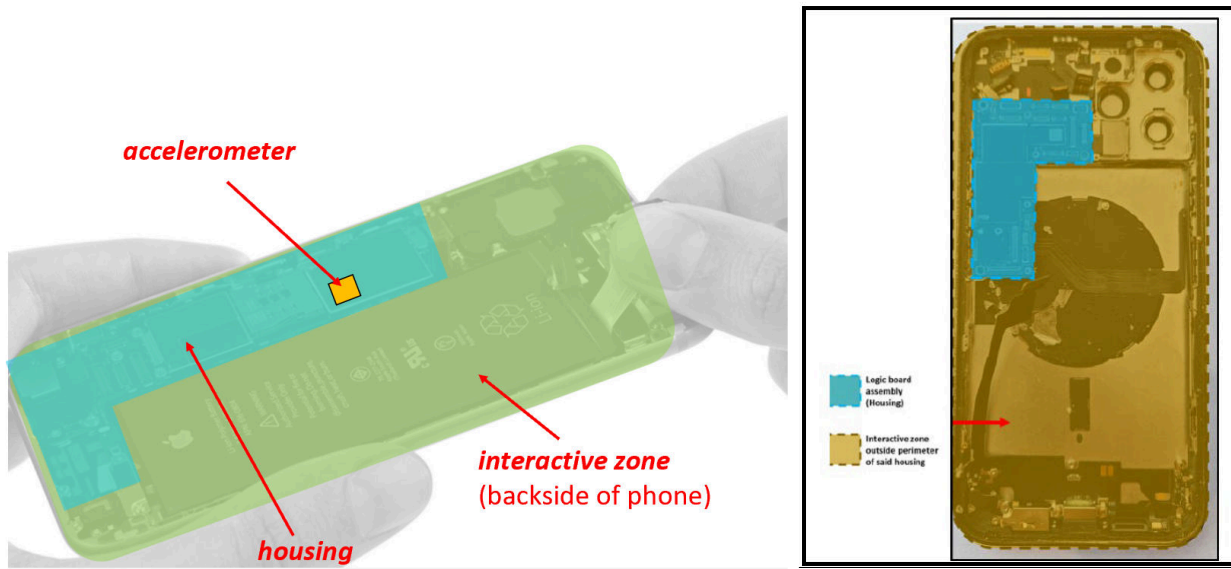
with the mounting surface, consistent with Haptic's understanding of this claim limitation as evidenced by Haptic's infringement contentions (APPLE-1101, 15-16, 50-51). APPLE-1008, [0030], Figs. 13, 15; APPLE-1003, ¶¶359-360. Haptic alleges the mounting surface is the part of the iPhone that engages with the housing. APPLE-1101, 12, 46. Haptic further alleges the mounting surface is aligned with the interactive zone on the iPhone's backside or sides, where the interactive zone overlays the mounting surface. *Id.*, 15-17, 50-51. As illustrated below, the interactive zone on the phone's backside and the mounting surface on the inside of the phone's back panel are located on two sides of the same back cover and lie in parallel planes and are accordingly aligned under Haptic's understanding of the claim limitation. APPLE-1101, 15-16, 50-51; APPLE-1003, ¶359.



Left: APPLE-1011, 6 (annotated)

Right: APPLE-1008, Fig. 13 (annotated)

Li-iFixit's interactive zone overlays the mounting surface outside a housing perimeter, consistent with Haptic's understanding of the claim limitation as evidenced by Haptic's infringement contentions. APPLE-1101, 16-17, 50-51. Li-iFixit's interactive zone spans the iPhone's backside and, as Haptic alleges, overlays the mounting surface. APPLE-1008, [0021], [0030]; APPLE-1003, ¶360. Because the iPhone's backside where the interactive zone is located is larger than the logic board (housing), the interactive zone extends beyond the perimeter of said housing, illustrated below in the annotated iFixit image. *Id.*



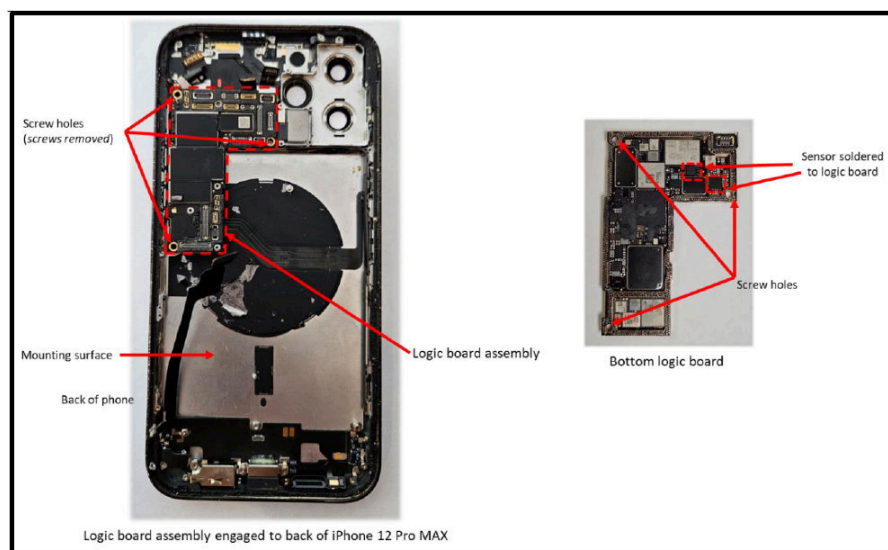
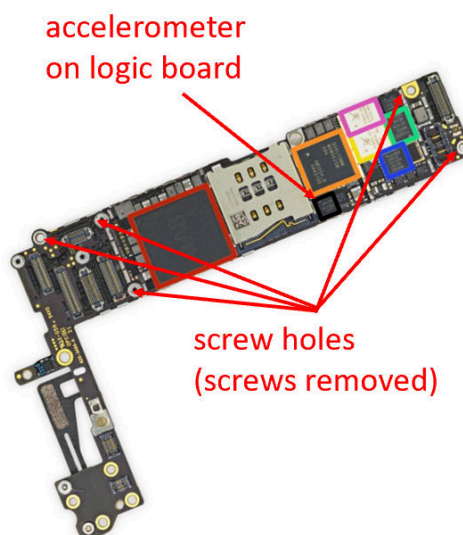
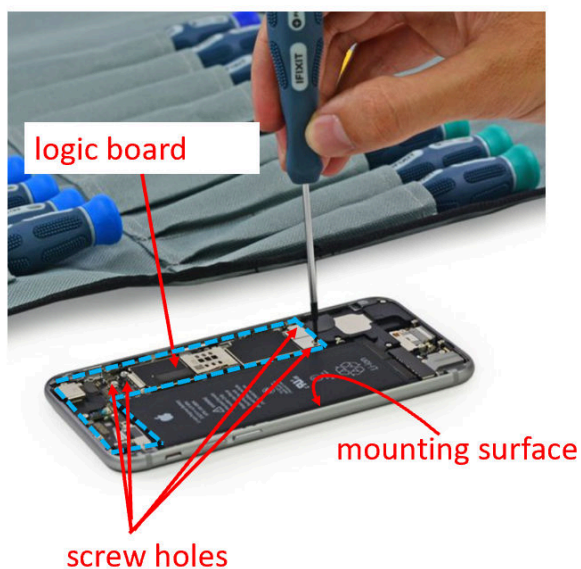
Left: APPLE-1011, 5 (modified; annotated)

Right: APPLE-1101, 17

[1b-v]

Li-iFixit's sensor (Accelerometer/Gyroscope) is in a fixed position (attached to the logic board) relative to the engagement means. APPLE-1011, 6-7; APPLE-1101, 17-18, 51-52; APPLE-1003, ¶¶361-362, 39-43. As shown below, the engagement means includes an attachment means (screws/screw holes, *see* [1a] and [1e]) and a transmission portion (portion of the logic board, *see* [1a] and [1e]). APPLE-1011, 4, 6-7, 9-10; APPLE-1008, Fig. 15; APPLE-1003, ¶362. In Li-iFixit, the accelerometer is attached to the housing (logic board assembly). APPLE-1011, 4, 6-7, 9-10; APPLE-1008, Fig. 15; APPLE-1003, ¶362. Because the sensor is fixed on the housing (accelerometer is soldered to the logic board) and the engagement means is fixed relative to the housing, the accelerometer is in

a fixed position relative to the engagement means. APPLE-1011, 4, 6-7, 9-10;
APPLE-1008, [0035]; APPLE-1003, ¶362.



Top: APPLE-1011, 4, 6-7 (annotated)

Bottom: APPLE-1101, 18

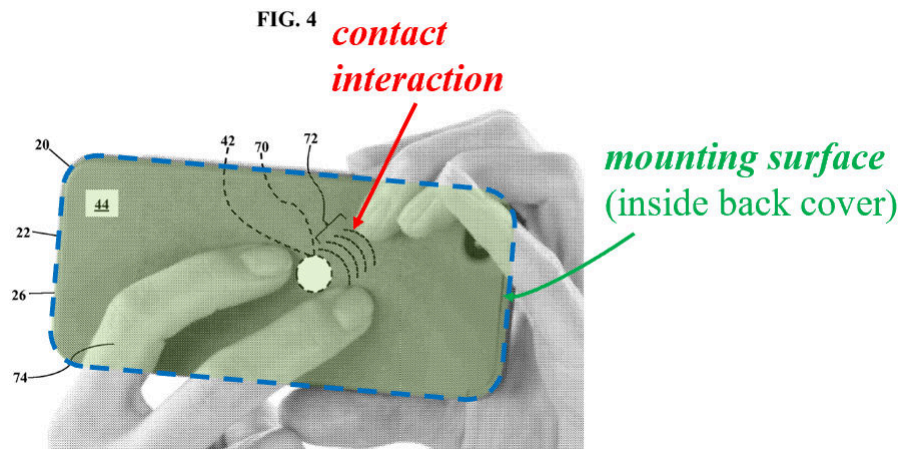
[1b-vi]

Li-iFixit tracks the '738 patent's preferred embodiment and renders obvious the structures recited in [1b-i] to [1b-v] and function of data signal detection recited in [1b-vi]. APPLE-1003, ¶¶363-365. Like the '738 patent, an accelerometer detects Li-iFixit's contact interaction (tapping the iPhone's back) as data signals (vibration from mechanical and/or acoustic waves). APPLE-1003, ¶363-364; APPLE-1008, [0022]-[0024], [0026], [0031]-[0030]. Li describes, "[a]s the gesture is drawn [on the supplemental gesture surface area 92 formed on the outer surface 44 of the backside 40 of the electronic device] the vibration 72 propagates through the body 26 as mechanical and/or acoustical waves [and the] ***gesture detector 42 senses the vibration.***" APPLE-1008, [0030]; APPLE-1003, ¶365. Because, under Haptic's understanding of the claim limitation as evidenced by Haptic's infringement contentions, the mounting surface is within the interactive zone of the iPhone's back cover, the contact interaction on the back of the iPhone impacts the mounting surface and is associated with the mounting surface within the interactive zone. APPLE-1101, 18-19, 53-54; APPLE-1008, [0030], [0037]; APPLE-1003, ¶¶363-365.

[1b-vii]

Li-iFixit's contact interaction (tapping the iPhone's back) comprises an impact on the mounting surface (the part of the iPhone that engages with the

housing), consistent with Haptic's construction (§III). APPLE-1003, ¶¶366-367; APPLE-1101, 12, 46; APPLE-1008, [0022]-[0023], Fig. 4.



APPLE-1008, Fig. 4 (annotated)

In the NDCal litigation, Haptic explained its construction of this term, stating “a person of ordinary skill in the art would understand an impact on a surface to include both impacts originating on the surface and impacts originating elsewhere that have an impact on the surface.” APPLE-1104, 9. Because Li-iFixit similarly describes a user tapping or drawing a gesture on the iPhone's backside opposite the mounting surface located on the iPhone's inside back panel, Li-iFixit provides [1b-vii] under Haptic's construction in which the user's tapping or gesture is an “impact[] originating elsewhere that [has] an impact on the surface.” *Id.*; APPLE-1003, ¶367; APPLE-1008, [0022]-[0023], Fig. 4.

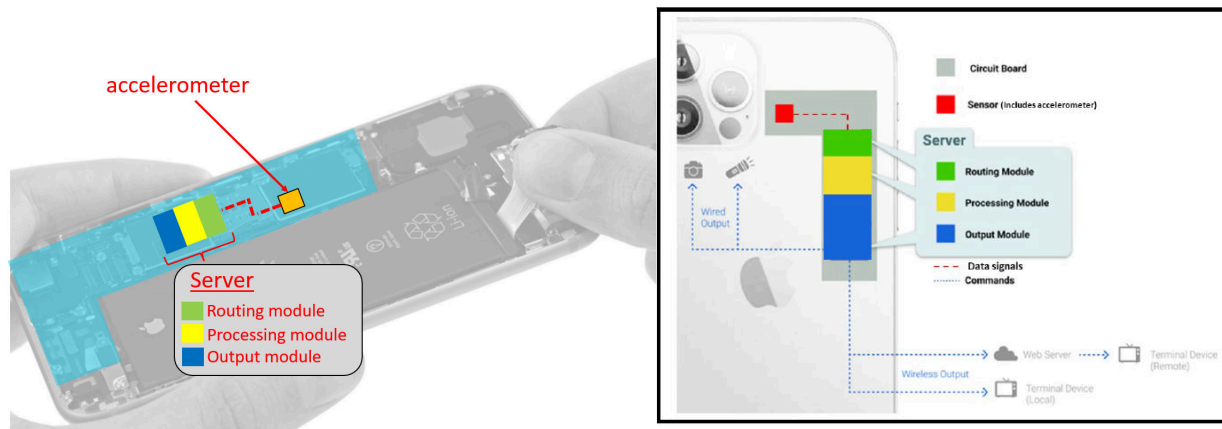
[1b-viii]

Li-iFixit's accelerometer detects data signals (vibration) that comprise

vibration data (mechanical waves) of the contact interaction. APPLE-1003, ¶368; APPLE-1008, [0026] (“sense mechanical waves”); *see* APPLE-1008, [0011], [0024], [0030], [0037], Fig. 17.

[1c-i]

Consistent with Haptic’s understanding of the meaning of the term “server” as evidenced by Haptic’s infringement contentions, Li-iFixit includes a server (including routing, processing and output modules; *see* §§IV.D.4.[1c-iii]-[1c-vi]) in communication (via logic board circuitry) with the sensor. APPLE-1101, 20-21, 54-55; APPLE-1008, [0022], Fig. 3; APPLE-1003, ¶¶369-370. “When the user draws and/or taps a gesture on the outer surface of the body... the [sensor] generates an output signal 52 [and] [t]he processor 30 [of the server] receives the output signal.” APPLE-1008, [0022]; *see id.*, [0023]. A POSITA would have understood that, in Li-iFixit, the server (processing, routing, output modules) is in communication with the accelerometer, illustrated below. APPLE-1003, ¶¶369-370.



Left: APPLE-1011, 5 (modified; annotated)

Right: APPLE-1101, 21

[1c-ii]

Li-iFixit's server includes a routing module (i.e., "circuitry that forms the path from the sensor to the processing module") (APPLE-1101, 22), consistent with Haptic's understanding of the claim element as evidenced by infringement contentions (see Fig. 5, above). APPLE-1003, ¶371; APPLE-1011, 5-7; APPLE-1101, 21-23, 55-56. Li-iFixit's routing module is discussed further in [1c-v].

§IV.D.4.[1c-v].

[1c-iii]

Li-iFixit includes a processing module (e.g., including the functionality of Li's processor 30) connected (via the logic board circuitry) to the routing module, consistent with Haptic's understanding of the claim element as evidenced by infringement contentions (see Fig. 5, above). APPLE-1003, ¶372; APPLE-1101,

23-24, 56-57; APPLE-1011, 6-7; APPLE-1008, [0022], [0038]-[0039], Fig. 3, Fig.

15. A POSITA would have understood that Li-iFixit's processing module is connected to the routing module based on Li's disclosure that the processing module receives data from the accelerometer for processing. APPLE-1003, ¶372. Li-iFixit's processing module is discussed further in [1c-vi]. §IV.D.4.[1c-vi].

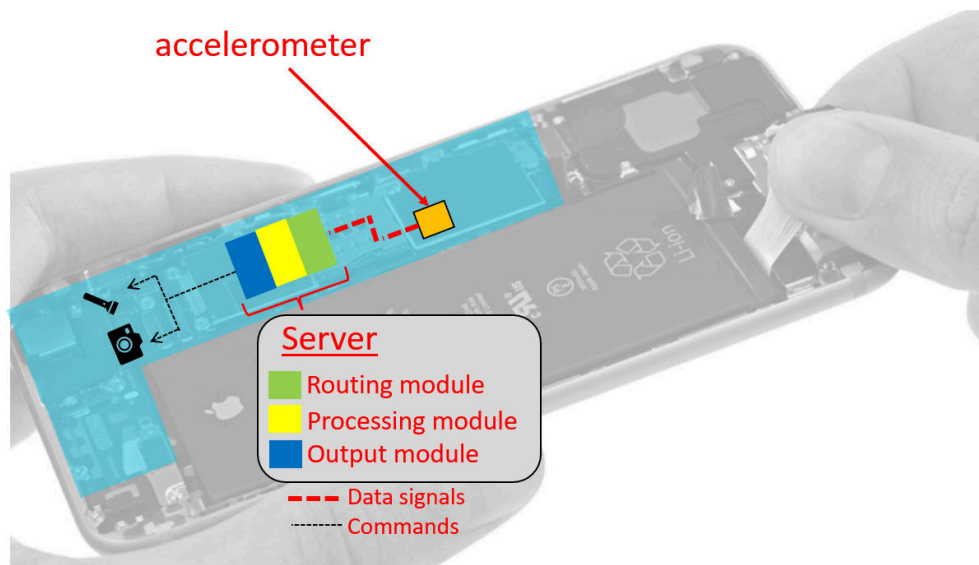
[1c-iv]

Li-iFixit includes an output module (i.e., "circuitry that forms the path from the processing module to the receiving module in a terminal device" (*see* [1d-i])) (APPLE-1101, 24) connected to the processing module, consistent with Haptic's understanding of the claim element as evidenced by infringement contentions (*see* Fig. 5, above). APPLE-1101, 24-25, 57-58; APPLE-1003, ¶373; APPLE-1011, 5-7; APPLE-1008, [0020], [0022]. A POSITA would have understood that Li-iFixit's output module is connected to the processing module based on Li's disclosure that the processing module determines a command that is transmitted to control a function of the electronic device. APPLE-1008, [0020], [0022]; APPLE-1003, ¶373. Li-iFixit's output module is discussed further in [1d-v]. §IV.D.4.[1d-v].

[1c-v]

Li-iFixit's routing module receives the data signals from the sensor before routing the signals to the processing module (*see* Fig. 5, below). §IV.D.4.[1c-ii];

APPLE-1008, [0020]-[0023], Figs. 3, 15; APPLE-1011, 6-10; APPLE-1003, ¶374. In Li-iFixit, “[t]he processor receives the output signal” from the sensor. APPLE-1008, [0022]. The routing module receives the data signals from the sensor, and the processing module receives the data signals from the routing module. APPLE-1008, [0020], [0022], Figs. 3, 15; APPLE-1011, 6-10; APPLE-1003, ¶374; APPLE-1101, 25-27, 58-60.



APPLE-1011, 5 (modified; annotated)

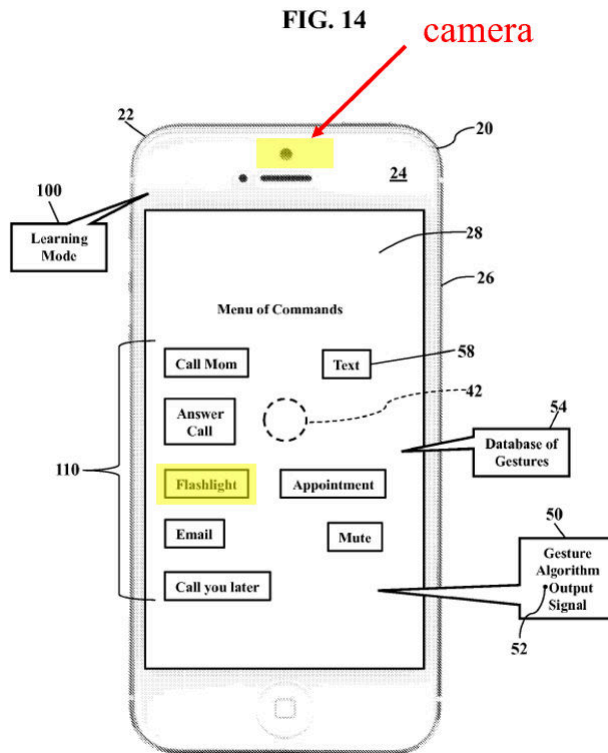
[1c-vi]

Under Haptic’s construction (§III), Li-iFixit’s processing module (including functionality of processor) determines (using a gesture algorithm) a data pattern (discrete data points of the output signal) corresponding to said data signals of said contact interaction and matches the data pattern with a gesture profile (command entries stored in a database). APPLE-1101, 25-27, 58-61; APPLE-

1003, ¶¶375-376. The gesture algorithm includes “instructions, code, and/or programs that cause the processor 30 to interpret any gesture input sensed by the gesture detector.” APPLE-1008, [0022], [0038]-[0039], Figs. 3, 18; §IV.D.4.[1c-iii]); APPLE-1003, ¶375. The processor matches the data pattern to a stored gesture (gesture profile) associated with a command by “compar[ing] the output signal 52 to the entries stored in the database 54 of gestures” and “retriev[ing] the corresponding command.” APPLE-1008, [0022]; *see id.*, [0032]; APPLE-1003, ¶376. Accordingly, the processing module determines whether the data signals represent a data pattern that corresponds to a matching gesture profile (including a tap profile). §III; APPLE-1003, ¶¶375-376.

[1d-i]

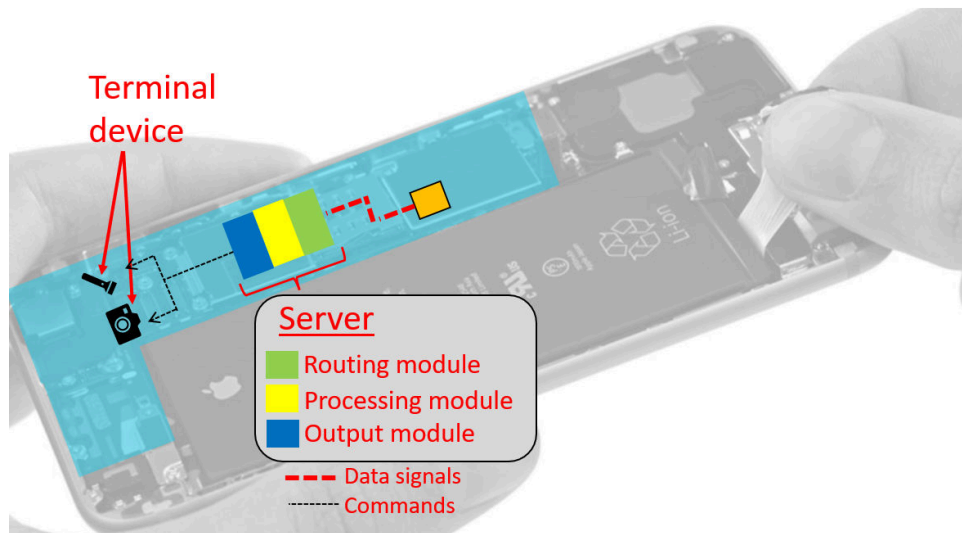
Consistent with Haptic’s construction (§III), Li-iFixit includes a terminal device (e.g., the iPhone’s camera or flashlight). APPLE-1101, 29-31, 61-64; APPLE-1003, ¶377; APPLE-1008, [0020], Fig. 14.



APPLE-1008, Fig. 14 (annotated)

[1d-ii]

Each Li-iFixit terminal device comprises a receiving module (i.e., “associated integrated electronics for receiving a command from the output module”) (APPLE-1101, 29), consistent with Haptic’s construction and infringement contentions. APPLE-1003, ¶¶378-380; APPLE-1101, 61-64; APPLE-1008, [0020]-[0022], Fig. 14; APPLE-1011, 6-7, 9-10.



APPLE-1011, 5 (modified; annotated)

For example, Li-iFixit's rear-facing camera (terminal device) includes a dedicated receiving module for wired connection to the output module and integrated electronics for receiving a command from the output module. APPLE-1011, 5-7; APPLE-1003, ¶¶379-380.



Right: APPLE-1011, 6 (annotated)

Left: APPLE-1101, 29

[1d-iii]

Under Haptic's construction (§III), Li-iFixit necessarily includes means for initiating activity of the terminal device corresponding to the command (i.e., "switches... for changing the status of each terminal device") (APPLE-1101, 32). APPLE-1101, 64-66; APPLE-1003, ¶¶381-382; APPLE-1008, [0020], [0022], Fig. 14. Li teaches the gesture detection and control method produce actions of the iPhone's applications and components in response to the user gestures matched to commands. APPLE-1008, [0020], [0022]. A POSITA would have understood that, without mechanisms to allow applications and components to perform their associated actions, the applications and components would be unable to function in response to commands. APPLE-1003, ¶¶381-382. A POSITA would have further understood that Li-iFixit's terminal devices that execute a status change in response to execution of commands would include actuators like switches, transistors, physical actuators or other actuating mechanisms that operate the terminal device and switches the device between statuses. APPLE-1003, ¶¶381-382; APPLE-1008, [0020], [0023].

[1d-iv]

Under Haptic's construction (§III), and as evidenced by Haptic's infringement contentions, each of Li-iFixit's terminal devices is in communication with the server based on Li's disclosure that each is controlled by the processor

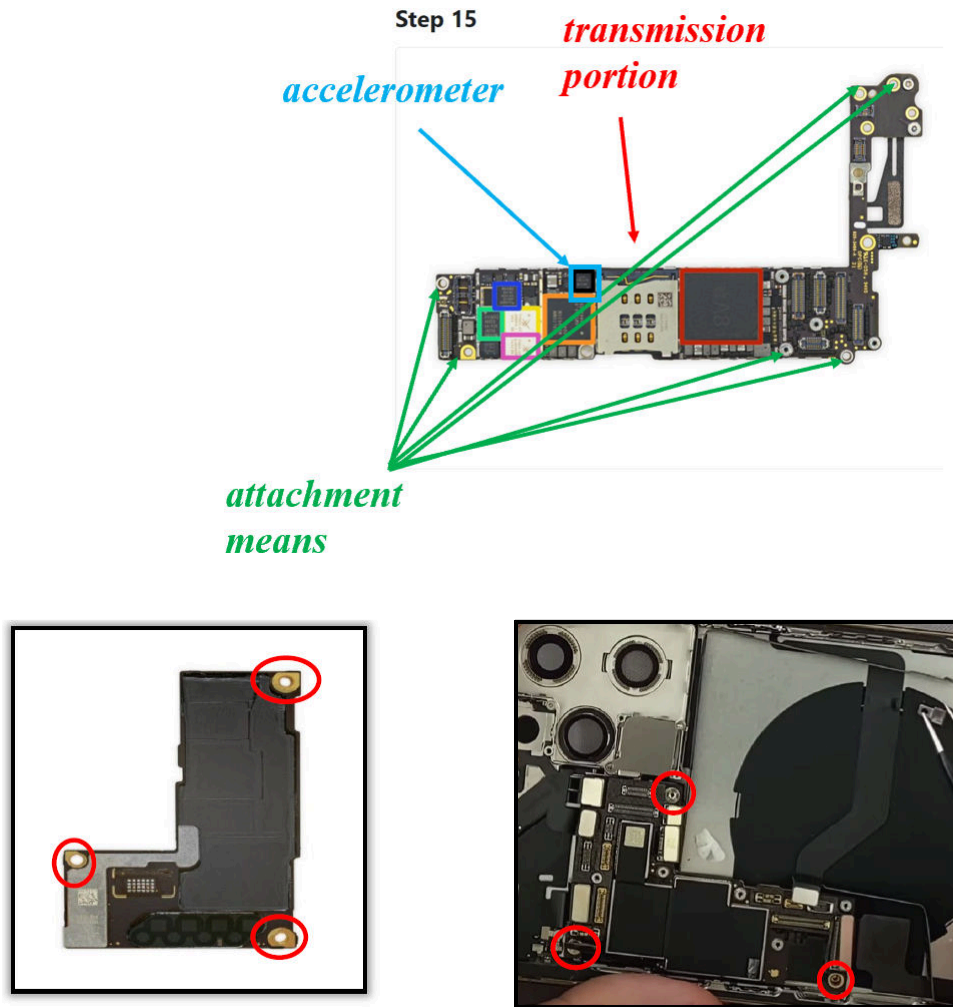
(i.e., part of the server) executing the command. APPLE-1101, 31-33, 64-66; APPLE-1008, [0020], [0022]; APPLE-1003, ¶¶383-384.

[1d-v]

Under Haptic's construction (§III), Li-iFixit's output module transmits the command from the processing module to the receiving module. §IV.D.4.[1c-iv]; APPLE-1008, [0020], [0022]; APPLE-1003, ¶385. A POSITA would have understood that Li's disclosure that the processor "executes the corresponding command" means that, in the gesture detection method, the instructions associated with the command are transmitted from the server's output module to the terminal device (phone's flashlight or camera) and received by the terminal device at a dedicated receiving module for wired connection (*see* [1d-ii]). APPLE-1003, ¶385.

[1e]

Under Haptic's interpretation (§III), and as evidenced by Haptic's infringement contentions, Li-iFixit includes screws/screw holes formed in a logic board assembly, which extends from the Accelerometer/Gyroscope (sensor) to the screws/screw holes. APPLE-1008, [0027], [0033]-[0035], Fig. 15; APPLE-1011, 3-7, 9-10; APPLE-1003, ¶¶386-397.



Top: APPLE-1011, 6-7 (annotated)

Bottom: APPLE-1101, 34

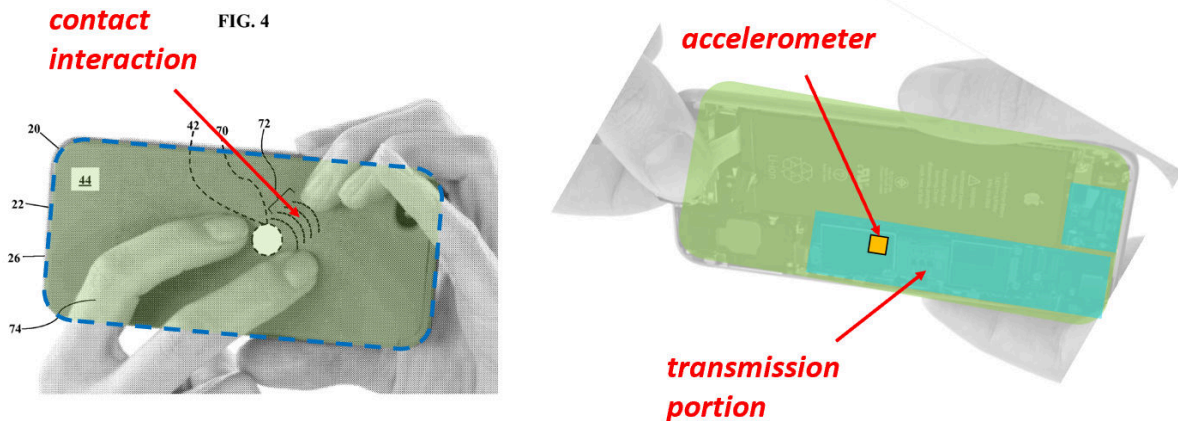
In Li-iFixit, an accelerometer (*see* [1b-i], [1b-iii]) is connected to attachment means (screws/screw holes) via a portion of a logic board, such that when the user taps on the iPhone's back, a vibration is created and transmitted through the logic board (transmission portion) to the accelerometer. APPLE-

1008, Fig. 15; APPLE-1003, ¶¶386-390. Li-iFixit's screws/screw holes and logic board assembly collectively perform the function of attaching said housing to said mounting surface and connecting said accelerometer to attachment means of said housing. *Id.* Further, Li-iFixit's transmission portion (part of the logic board) comprises a material (glass epoxy composite, e.g., FR-4) with a flexibility different than the mounting surface (aluminum back of iPhone). APPLE-1003, ¶¶391-392 (citing APPLE-1034; APPLE-1008, [0037], [0035], [0023]; APPLE-1011, 6-7, 9-10. According to Haptic, FR-4 and aluminum typically have Young's moduli of 0.6-2.6 gPa and ~68 gPa, respectively. APPLE-1101, 35-36, 68-69. Furthermore, a POSITA would have recognized that the logic board has a different flexibility than the iPhone's back cover due to different material composition, thickness, design, and intended use of each component. APPLE-1011, 6-7, 9-10; APPLE-1003, ¶392.

Under Haptic's construction, and as evidenced by Haptic's infringement contentions, the transmission portion also sets a rigid position of the accelerometer relative to the mounting surface (back of iPhone). APPLE-1101, 36-37, 69-70; APPLE-1011, 6-7, 9-10; APPLE-1008, [0035], [0023]; APPLE-1003, ¶¶. The accelerometer is soldered to the logic board, which is rigid and attached to the mounting surface by screws/screw holes. APPLE-1008, [0035]. The accelerometer does not move (i.e., is rigid) relative to the mounting surface.

APPLE-1003, ¶¶393-394.

Regardless of the exact bounds of “said contact interaction generating said data signals of said sensor through said transmission portion,” Li-iFixit includes at least the ’738 patent’s preferred embodiment. APPLE-1003, ¶¶395-397; *supra* §IV.A.4.[1e] (discussion of ’738 patent disclosure in Ground 1A). Like the ’738 patent, Li-iFixit’s contact interaction is detected as data signals (mechanical and/or acoustic waves) by the accelerometer. APPLE-1003, ¶¶395-397, 363-365; APPLE-1008, [0022]-[0024], [0026], [0030]-[0031]; APPLE-1001, 10:57-59; *see* [1a], [1b-vi]. Under Haptic’s construction (§III), Li-iFixit’s contact interaction generates data signals (vibration from mechanical waves) detected by the accelerometer through the transmission portion. *See* [1b-i], [1b-iii], and [1b-vi]-[1b-viii]. In Li-iFixit, when the user taps the iPhone’s back, a vibration is generated and transmitted through the logic board to the sensor. APPLE-1008, [0023], Figs. 4, 15; APPLE-1011, 6-7, 9-10; APPLE-1003, ¶¶395-397 (citing APPLE-1009).



Left: APPLE-1008, Fig. 4 (annotated)

Right: APPLE-1011, 5 (annotated; modified)

Accordingly, under Haptic's construction §III, and as evidenced by Haptic's infringement contentions (APPLE-1101, 9-12, 33-35, 43-45, 66-68), Li-iFixit includes screws/screw holes (attachment means) and a portion of a logic board assembly (transmission portion). Taken together, these components attach the logic board portion (housing) including the accelerometer to the iPhone's inside back cover (mounting surface), connect the accelerometer to the screws/screw holes (via the logic board), set a rigid position of the accelerometer relative to the iPhone's inside back cover (mounting surface), and transmit data signals from the screws/screw holes to the accelerometer. §III; APPLE-1011, 4, 6-7, 9-10; APPLE-1008, Fig. 15; APPLE-1003, ¶¶386-397.

b) Claim 2

As described in [1b-iv], under Haptic's understanding of the claim limitations as evidenced by Haptic's infringement contentions (APPLE-1101, 38, 71), Li-Fixit's interactive zone aligns with the mounting surface. *Supra* §IV.D.4.[1b-iv]; APPLE-1003, ¶¶398, 359-390. The interactive zone is also coplanar with the mounting surface "because the interactive zone includes the back side and sides of the iPhone." APPLE-1008, [0022]-[0023], [0030], Figs. 13, 15; APPLE-1011, 4, 6-7, 9-10; APPLE-1003, ¶399.

c) Claim 8

Under Haptic's construction of a "terminal device" (§III), Li-iFixit includes a flashlight as a terminal device (i.e., the claimed lighting fixture). APPLE-1008, Fig. 14; APPLE-1003, ¶400.

d) Claim 9

Under Haptic's construction §III, as discussed above for [1d-i]-[1d-v], Li-iFixit includes at least a first terminal device (e.g., camera) and an additional terminal device (e.g., flashlight). *See* §IV.D.4.[1d-i]-[1d-v]; APPLE-1008, [0020] ("associate any gesture to any action"), [0022]-[0023], [0031]-[0033], [0093], Fig. 14; APPLE-1101, 39-40, 73; APPLE-1003, ¶¶401-405. For example, Li describes that user gestures can be used to control the phone's flashlight or "to execute a command, such as transitioning to a different display screen, answering a call,

capturing a photo, or any other action.” APPLE-1008, [0020], Fig. 14.

Accordingly, in Li-iFixit, the terminal device (camera) and additional terminal device (flashlight) are both in communication with the server and capable of receiving an instruction from the output module of the server to control each the device. APPLE-1003, ¶404.

It would have been obvious to a POSITA based on Li’s disclosure that the additional terminal device is controlled by the same components as the first terminal device – that is, by an additional receiving module and means for initiating activity based on a command received from the output module. *See* §IV.D.4.[1d-i]-[1d-v]; APPLE-1003, ¶¶401-405.

e) Claim 10

[10pre]-[10k-i]

See [1pre]-[1e] (Ground 2A). *Supra* §IV.D.4.[1pre]-[1e]; APPLE-1003, ¶¶406, 348-399.

[10k-ii]

Li-iFixit’s command corresponds to activity of the terminal device (e.g., “transitioning to a different display screen, answering a call, capturing a photo, or any other action”). APPLE-1008, [0020]; *see id.*, [0022] (“database ... relates different output signals 52 to their corresponding commands”), [0032]; APPLE-1003, ¶¶407-409.

[10l]

Li-iFixit performs the activity (e.g., transitioning screens, answering calls, capturing photos) with the terminal device. APPLE-1008, [0020], [0022]-[0023], [0035]; APPLE-1003, ¶¶410. Specifically, Li-iFixit's terminal devices "transition[] to a different display screen, answer[] a call, captur[e] a photo, or [perform] any other action." APPLE-1008, [0020]; APPLE-1003, ¶¶410.

E. GROUND 2B: LI-iFIXIT-SACHS

1. Li-iFixit-Sachs

In Li-iFixit-Sachs, the gesture detection system in an iPhone detects vibrational data, per Li and iFixit (*see* §IV.D.3), and processed by detecting data features, per Sachs. APPLE-1007, [0009]-[0012], [0036], [0079], [0094], [0101]-[0104]; APPLE-1008, [0022]-[0023], [0030]-[0033], [0037]; APPLE-1003, ¶¶411-415.

A POSITA would have been motivated to pursue the combination for several reasons.

- A POSITA would have understood that Sach's method limits the number of data points that would need to be compared to the database, reducing the processing burden. APPLE-1007, [0015], [0010], [0079]; *see* APPLE-1008, [0039]; APPLE-1003, ¶¶416-417.
- A POSITA would have been motivated to implement Li-iFixit to

clearly segment the output signal into a limited number of features that can be efficiently compared to the database of gestures, per Sachs. APPLE-1007, [0010]; APPLE-1003, ¶418.

- For the same reasons described above (§IV.B.2), a POSITA would have been motivated to implement Li-iFixit with Sachs' teachings to identify large magnitude pulses, timing between features, and a period after a final impact. APPLE-1007, [0079], [0010], [0090], [0101]-[0104]; APPLE-1003, ¶¶419-421 (citing APPLE-1009).
- A POSITA would have understood that the combination of known elements according to known methods would have yielded predictable results, as each element performs a similar function combined as it does separately, the combination would have been well within a POSITA's skill, at least because identifying features in data for comparison to data profiles was well-known by the Critical Date, as Sachs teaches. APPLE-1003, ¶¶422-423. Accordingly, a POSITA would have had a reasonable expectation of success in doing so for the reasons explained above and because the identification of data signal features for comparison to a mapped pattern was well known to a POSITA by the Critical Date. APPLE-1003, ¶¶422-423.

2. Analysis

a) Claim 4

[4a]

See [1b-vii] (Ground 2A). *Supra* §IV.D.4.[1b-vii]; APPLE-1003, ¶¶424, 366-367.

[4b]

Li-iFixit-Sachs processes data signals (output signal capturing motion data) to identify data features (pattern) including a large-magnitude pulse associated with the interaction (defined peak corresponding to the impact) and a predetermined period of time after an interaction (defined time period after a last defined peak) for determining the gesture is complete. §III; APPLE-1003, ¶¶425-429; APPLE-1007, [0015], [0079], [0096], [0120]. Sachs' data features identified in the motion data include a large magnitude pulse (defined peak corresponding to the impact) (APPLE-1007, [0102]) and a predetermined period of time following the gesture. APPLE-1007, [0094] ("a predetermined period of time [] during which no additional large-magnitude pulses are detected").

A POSITA would have understood that in the Li-iFixit-Sachs combination, the data pattern that the processor matches to the stored gesture profile in the database of gestures includes the data features identified by Sachs to provide efficient processing and matching of the gestures, while also allowing for minor

variations in the way a user inputs gestures. APPLE-1003, ¶429; §IV.E.1.

b) Claim 5

[5a]

Li-iFixit-Sachs' contact interaction includes a plurality of impacts on the mounting surface. APPLE-1003, ¶¶430-432; APPLE-1008, [0020]-[0023]; *see* APPLE-1007, [0112] ("three tap gestures").

[5b]

See [4b] (Ground 2B). APPLE-1003, ¶¶433-435, 425-429; §IV.E.2.[4b]; APPLE-1007, [0015], [0079], [0094], [0096], [0102], [0120]. Li-iFixit-Sachs' data signals (pattern) are processed to identify a defined time period between each defined peak. APPLE-1007, [0079] ("time between two data features"); APPLE-1003, ¶¶433-435; (citing APPLE-1009).

c) Claim 11

See §IV.E.2.[5a]; APPLE-1003, ¶¶436, 430-432. As explained above with regard to claim 5, Li and Sachs both make clear that a user can make a gesture that includes a plurality of impacts (e.g., taps) on a surface. APPLE-1008, [0021] ("The gesture detector 42 recognizes simple taps and swipes, more complex geometric shapes, and even alphanumeric characters."), *see also id.*, [0020]-[0023]; APPLE-1007, [0112] ("three tap gestures").

V. DISCRETIONARY DENIAL – *Fintiv*

The *Fintiv* factors do not favor denial.

Factor 1 is neutral; neither party has requested a stay in co-pending litigation.

Factor 2 favors institution. Based on currently available statistics, the scheduled 9/29/2025 trial date is likely to change. *See e.g.*, APPLE-1102, 8, APPLE-1105, 2; APPLE-1106. Median time-to-trial in NDCal is 48.9 months, predicting trial in December 2027—significantly later than a FWD deadline. APPLE-1103, 66; APPLE-1102, 8.

Factor 3 favors institution; Apple has filed this Petition ahead of the one-year time bar, while litigation is in early stages. Significant resources on invalidity have not been expended. *See* APPLE-1101; APPLE-1105, 2.

Factor 4 is neutral; no stipulation has been offered.

Factor 5 is neutral; the parties in the litigation are the same.

Factor 6 favors institution; the Petition’s merits are compelling.

VI. CONCLUSION AND FEES

The Challenged Claims are unpatentable. Please charge fees to Deposit Account 06-1050.

VII. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8(a)(1)

A. Real Party-In-Interest Under 37 C.F.R. § 42.8(b)(1)

Apple Inc. is the petitioner and the real party-in-interest.

B. Related Matters Under 37 C.F.R. § 42.8(b)(2)

Apple is not aware of any disclaimers, reexamination certificates or petitions for *inter partes* review for the '738 patent. The '738 patent is the subject of civil action: *Haptic Inc. v. Apple Inc.* 1-23-cv-01351 (WDTX), filed November 6, 2023, which has been transferred to NDCal with case number 3:24-cv-02296-JSC).

C. Lead And Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

Apple provides the following designation of counsel.

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D. Service Information

Please address all correspondence and service to the address listed above.

Apple consents to electronic service by email at IPR50095-0190IP1@fr.com.

Respectfully submitted,

Dated: September 30, 2024

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CERTIFICATION UNDER 37 CFR § 42.24

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter Partes* Review totals 13,906 words, which is less than the 14,000 allowed under 37 CFR § 42.24.

Dated: September 30, 2024

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that on September 30, 2024, a complete and entire copy of this Petition for *Inter Partes* Review and all supporting exhibits were provided via Federal Express, to the Patent Owner by serving the correspondence address of record as follows:

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