

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	RESERVED
APPLE-1009	U.S. Publication No. 2010/0256947 to Kim (“Kim”)
APPLE-1010-1034	RESERVED
APPLE-1035	Wilmar Hernandez, <i>Improving the Response of a Rollover Sensor Placed in a Car under Performance Tests by Using a RLS Lattice Algorithm</i> , 5 Sensors 613-632 (2005)
APPLE-1036	Mark Serridge & Torben Licht, <i>Piezoelectric Accelerometer and Vibration Preamplifier Handbook</i> (1987)
APPLE-1037	Wong et. al, <i>Clinical Application of Sensors for Human Posture and Movement Analysis: a Review</i> , 31 Prosthetics and Orthotics International 62-75 (2007)
APPLE-1038	Majid Dadafshar, <i>Maxim Integrated Application Note 5830 - Accelerometer and Gyroscopes Sensors: Operation, Sensing, and Applications</i> (2014)

APPLE-1039	STI Vibration Monitoring, Inc., <i>Accelerometer Installation Guide – Field Application Note</i> , (2012)
APPLE-1040	Texas Instruments Application Report – 3-V Accelerometer Featuring TLV2772, SLVA040 (1998)
APPLE-1041	Dr. Hisham El-Sherif, Lecture 7: Piezoelectric Transducer slides (2010)
APPLE-1042	Artur Trosin, <i>Separation of Concerns vs. Single Responsibility Principle (SoC vs. SRP)</i> , (January 26, 2009)
APPLE-1043	Peri Tarr et al., <i>Workshop on Multi-Dimensional Separation of Concerns in Software Engineering</i> , ICSE '00 Proceedings of the 22nd International Conference on Software Engineering 809 (2000), DOI: https://doi.org/10.1145/337180.337827
APPLE-1044	Derek Greer, <i>The Art of Separation of Concerns</i> , Aspiring Craftsman Blog (January 3, 2008) (archived by Wayback Machine on November 11, 2011)
APPLE-1045	Hayim Makabee, <i>Effective Software Design: Separation of Concerns</i> , (February 5, 2012)
APPLE-1046	U.S. Publication No. 2014/0327526 to Bess
APPLE-1047	U.S. Publication No. 2011/0087454 to Lee
APPLE-1048	U.S. Patent No. 9,712,895 to Yeo
APPLE-1049	PCT Publication No. WO2012058770 to Slupsky
APPLE-1050	M. Chan et al., <i>A review of smart homes- Present state and future challenges</i> , Computer Methods and Programs in Biomedicine, vol. 91 (2008) 55-81

- APPLE-1051 M. Vacher et al., *Complete sound and speech recognition system for heath smart homes: Application to the recognition of activities of daily living*, Recent Advances in Biomedical Engineering, ed. Domenico Campolo, (2010) 1-26
- APPLE-1052 U.S. Publication No. 2010/00085216 to Ms
- APPLE-1053 Ava Mutchler, *Voice Assistant Timeline: A Short History of the Voice Revolution*, voicebot.ai (July 14, 2017) (retrieved from <https://voicebot.ai/2017/07/14/timeline-voice-assistants-short-history-voice-revolution/>)
- APPLE-1054 Merriam Webster Dictionary, Web Entry for “Accelerometer,” (retrieved from <https://www.merriam-webster.com/dictionary/accelerometer>)
- APPLE-1055 Merriam Webster Dictionary, Web Entry for “Sensor,” (retrieved from <https://www.merriam-webster.com/dictionary/sensor>)
- APPLE-1056-1100 RESERVED
- APPLE-1101 Haptic Preliminary Infringement Contentions (March 18, 2024), Case No. 1:23-CV-1351-DII
- APPLE-1102 K. Vidal Memorandum on *Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation*, 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 3	
[3pre]	The control system, according to claim 1,
[3a]	wherein said transmission portion is comprised of a spring loaded portion so as to reduce damping of said contact interaction.
Claim 6	
[6pre]	The control system, according to claim 1,
[6a-i]	further comprising: an additional sensor contained within said housing,
[6a-ii]	said additional sensor forming an additional interactive zone defined by an additional range of said additional sensor,
[6a-iii]	said additional interactive zone being aligned with said mounting surface,
[6a-iv]	said additional sensor being in a fixed position relative to said engagement means,

[6a-v]	said server being in communication with said additional sensor,
[6b]	wherein said contact interaction with said mounting surface within said additional interactive zone is detected by said additional sensor as additional data signals,
[6c]	wherein said processing module determines said data pattern corresponding to said data signals of said sensor and said additional data signals of said additional sensor.
Claim 7	
[7pre]	The control system, according to claim 6,
[7a]	wherein said interactive zone of said sensor overlaps with said additional interactive zone of said additional sensor.
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 12	
[12pre]	The method of controlling the terminal device, according to claim 10,

[12a]	wherein said housing is further comprised of an additional sensor, said additional sensor being connected to said server,
[12b]	wherein the step of detecting said contact interaction as data signals with said sensor further comprises detecting said contact interaction as additional data signals with said additional sensor;
[12c]	wherein the step of receiving said data signals from said sensor with said routing module further comprises receiving said additional data signals from said additional sensor with said routing module, and
[12d]	wherein the step of determining said data pattern further comprises determining said data pattern corresponding to said data signals and said additional data signals with said processing module.
Claim 13	
[13pre]	The method of controlling the terminal device, according to claim 12, s
[13a]	wherein the step of making a physical impact on said mounting surface further comprises making a plurality of physical impacts on said mounting surface,
[13b]	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 3, 6-7, and 12-13 (“Challenged Claims”) of U.S. Patent No. 9,996,738 (“the ’738 patent”).

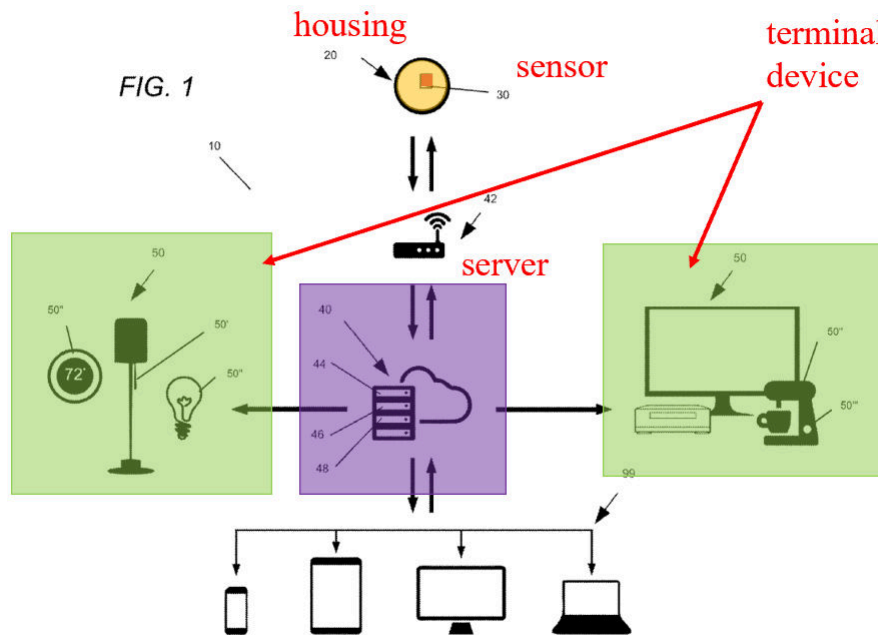
I. STANDING

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

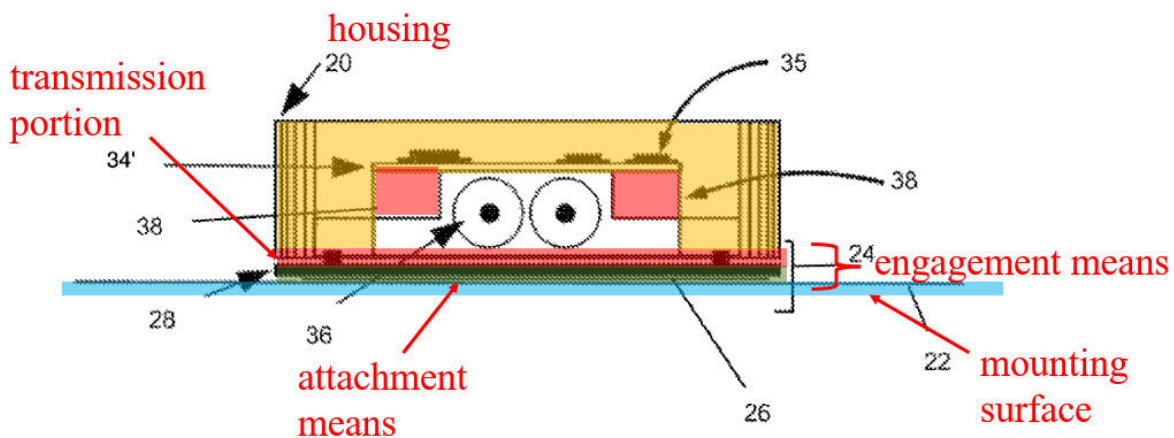


FIG. 4

APPLE-1001, Fig. 4 (annotated)

The '738 patent describes that “[i]n an alternate embodiment, there can be more than one sensor.” *Id.*, 4:59-60.

B. Prosecution History

During prosecution, Applicant made significant amendments to distinguish

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

APPLE-1001, 7:7-9.

over prior art references the Office cited, arguing the art did not describe “the transmission portion of the engagement means and relationship of the sensor relative to the mounting surface 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, and Orr, 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)”) 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. The constructions are relevant to claim terms that appear in claims 1 and 10, from which the Challenged Claims depend, and certain of the Challenged Claims also recite these claim terms. 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

³ APPLE-1003, ¶¶30-43.

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 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”	<u>Subject to 112(f):</u> Function: • Engagement • Attaching or holding the housing to the mounting surface • 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	<u>Subject to 112(f):</u> Function: • Engagement • Attachment or holding the housing 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

Claim Term	Apple's Construction	Haptic's Construction
	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)	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) 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)	No construction necessary
“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	<u>Subject to 112(f):</u>	No construction necessary

⁴ All “module” terms are also found in claim 10.

Claim Term	Apple's Construction	Haptic's Construction
determining a data pattern corresponding to said data signals of said contact interaction and matching said data pattern with a gesture profile”	Functions: • Processing • Determining a data pattern corresponding to the data signals • Matching the data pattern with a gesture profile 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,	No construction necessary

Claim Term	Apple's Construction	Haptic's Construction
	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)	
"receiving module"	<u>Subject to 112(f):</u> Function: • Receiving Structure: • Receiving module 52 • Equivalents thereof (APPLE-1001, 5:43-36, 5:51-53, 10:63-64, 11:6-9)	No construction necessary
"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, ¶¶1-366.

Ground	Claims	Basis - § 103	Claim Construction
1A	3, 6-7, 12-13	Murakoshi-Stewart	Haptic's
1B	3, 6-7, 12-13	Murakoshi-Stewart-Sachs	Haptic's
1C	3, 6-7, 12-13	Murakoshi-Stewart-Sachs-Orr	Apple'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)

A. GROUND 1A: MURAKOSHI-STEWART

1. Murakoshi

Murakoshi discusses “controlling a user interface of a device [comprising] one or more 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, ¶¶100-102. 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]. Murakoshi describes that the apparatus can include “one or more sensors” (*id.*, [0025]) which are “operable to detect one or more vibrations of the vibratory surface.” *Id.*, [0089].

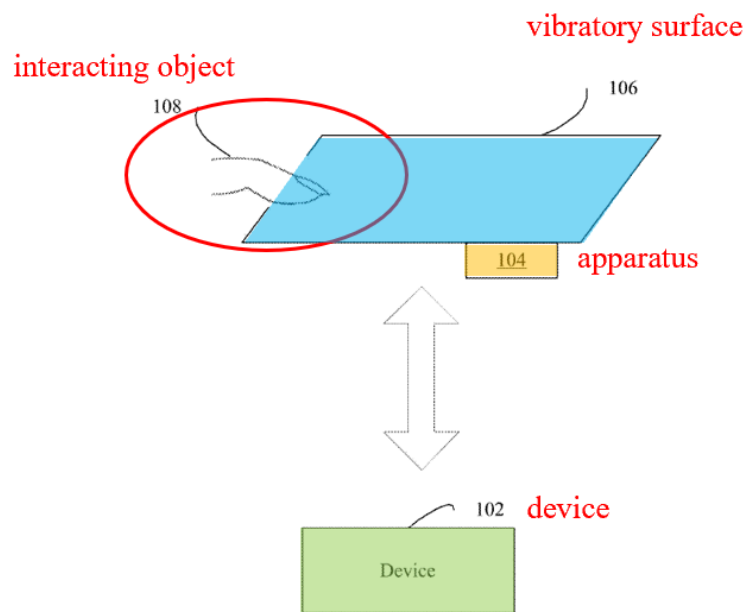


FIG. 1

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].

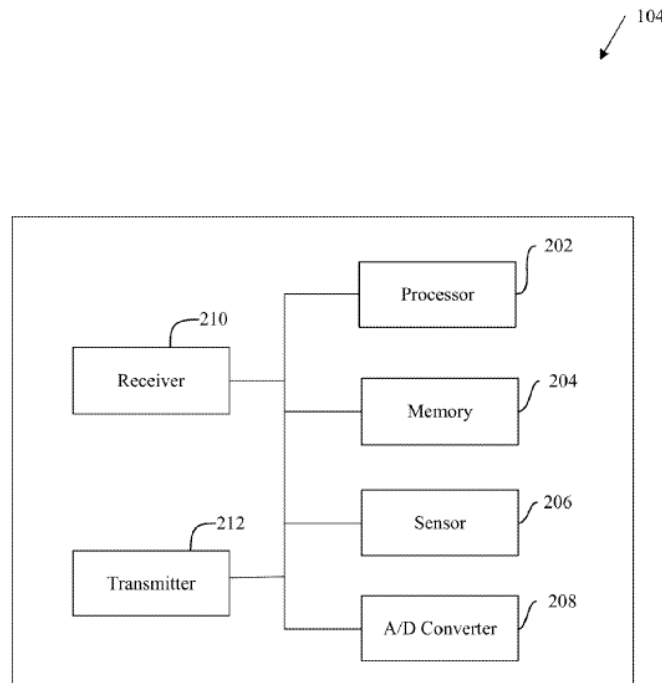


FIG. 2

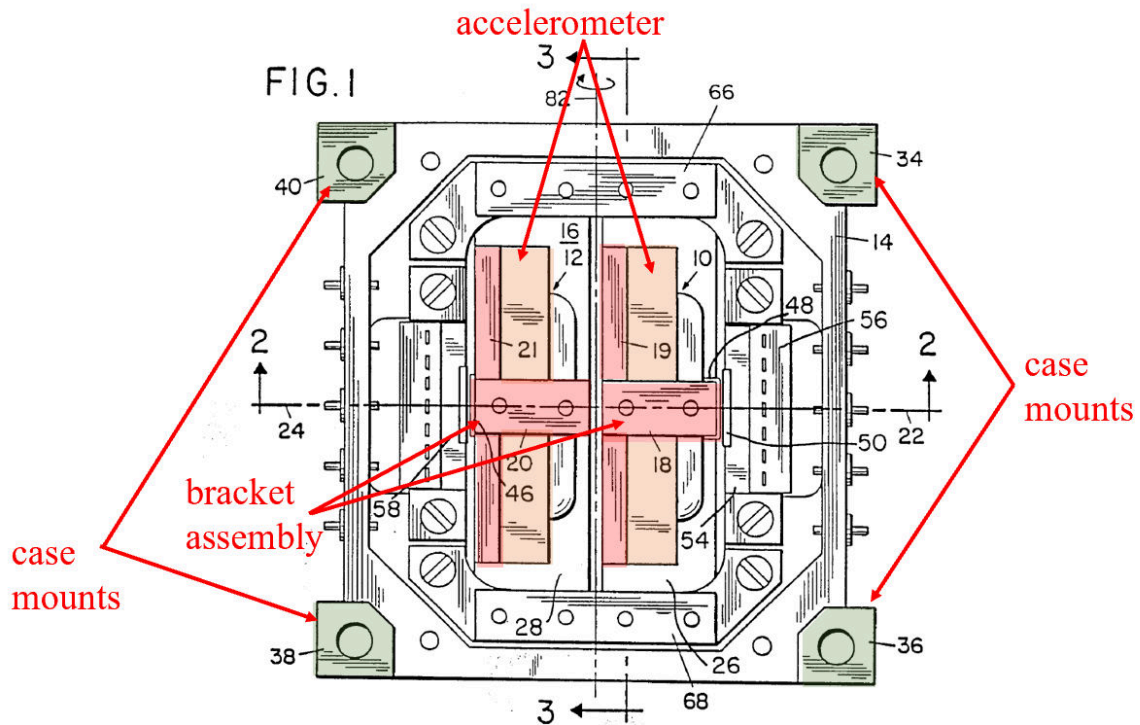
APPLE-1004, Fig. 2

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, ¶¶103-104. Stewart describes a sensing device with two accelerometers 10 and 12. APPLE-1006, 5:21-25, Fig. 1. “[A]ccelerometers are positioned within a cavity 16 within the case.” *Id.*, 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, ¶¶105-121.

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, ¶¶105-109. A POSITA would have further 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, ¶¶105-109.

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, ¶¶110-112.

⁵ In this Petition, Apple proposes combining the respective teachings of the art references, not bodily incorporation or physical integration.

- 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, ¶¶113-114, 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, ¶¶115, 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, ¶¶116-117; 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, ¶118; *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, and, accordingly, a POSITA would have had a reasonable expectation of success in doing so, 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, ¶¶119-121.

4. Analysis

a) Claim 3

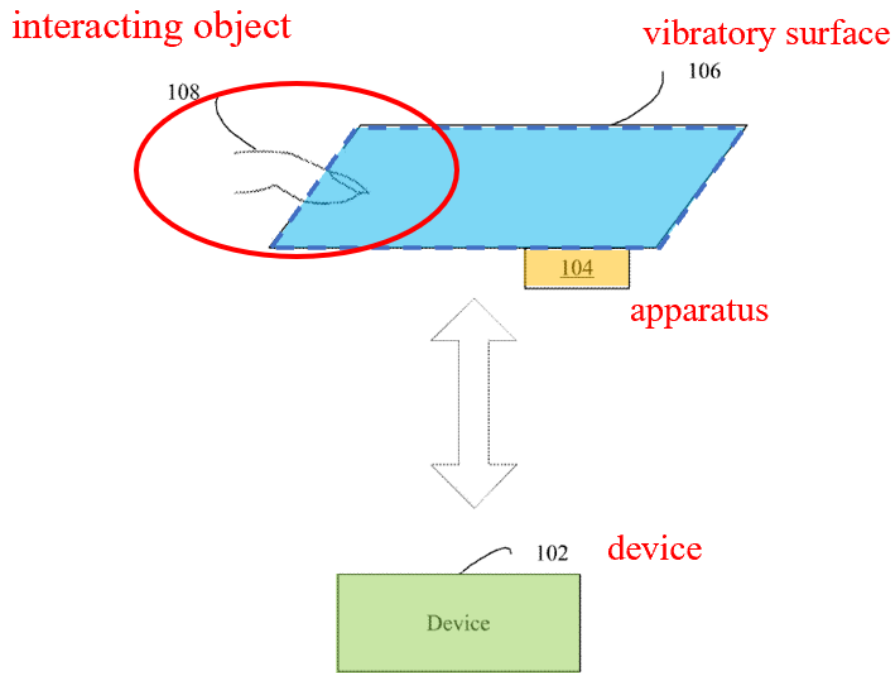
[3pre] The control system, according to claim 1,

Under Haptic's constructions of the relevant elements of claim 1, Murakoshi-Stewart renders obvious the control system of claim 1, including each of the limitations of claim 1 as follows.⁶ APPLE-1003, ¶¶123-177.

[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, ¶¶123-125.

⁶ See IPR2024-01475 filed concurrently.

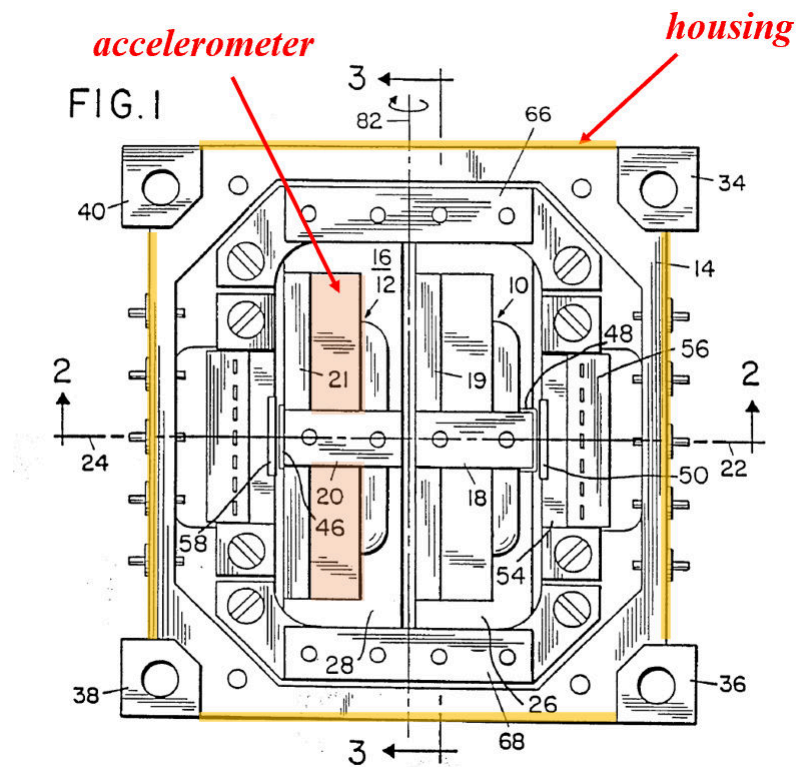


APPLE-1004, Fig. 1 (annotated)

[1a]

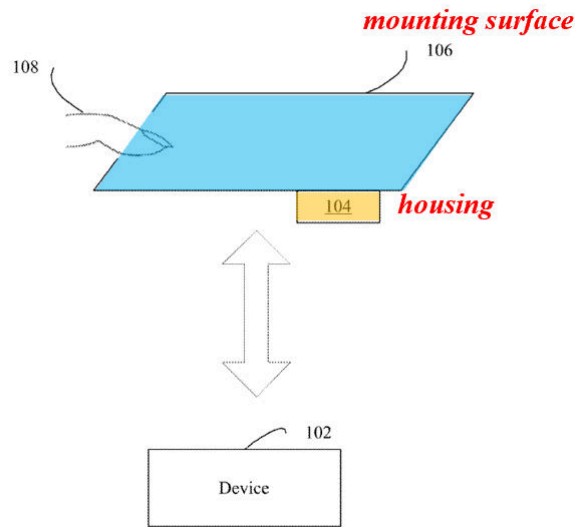
In Murakoshi-Stewart, an apparatus, per Murakoshi, is implemented with Stewart's teachings to position the accelerometer within a casing (housing).

APPLE-1006, 5:8-9, Fig. 1; APPLE-1003, ¶¶126-128; §IV.A.3.



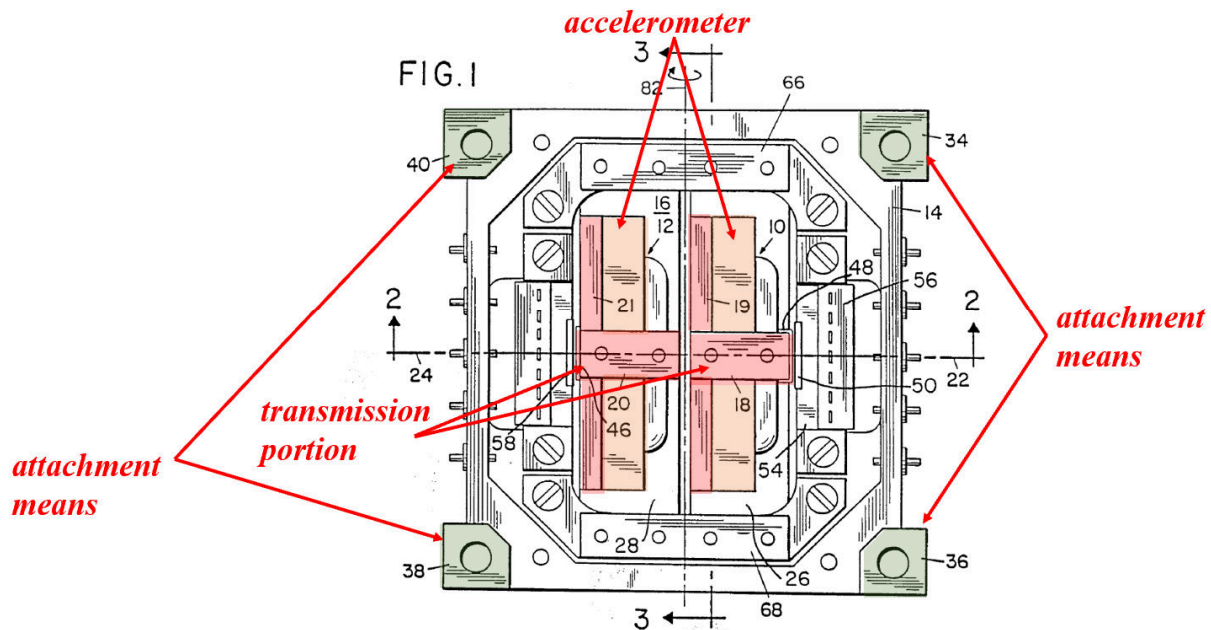
APPLE-1006, Fig. 1 (annotated)

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, ¶¶127-128.



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)

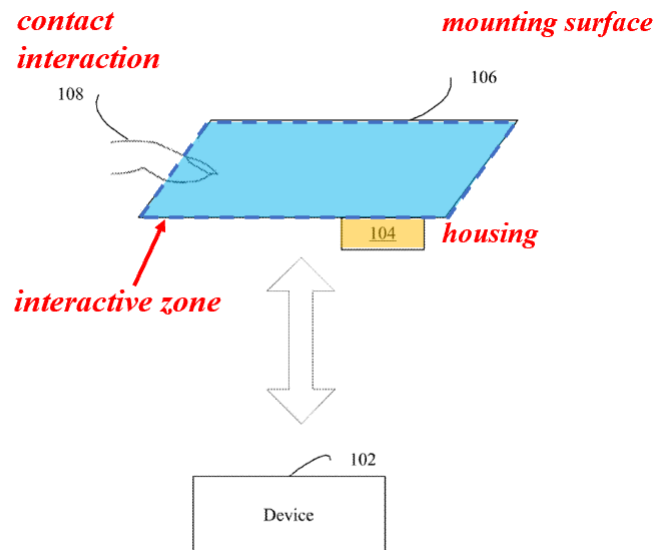
[1b-i]

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, ¶¶129-130; §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, ¶¶131-132. 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)

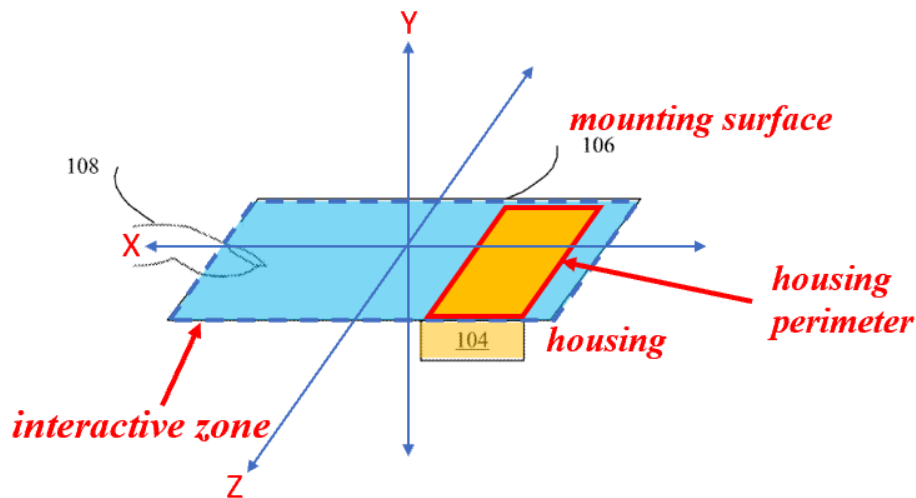
Fig. 1 depicts an interaction of an object with the vibratory (mounting) surface for detection by the sensor in the apparatus (housing). APPLE-1004, [0016], [0021]. A POSITA would have understood from Murakoshi’s discussion of a vibratory surface that it defines a zone within range of the sensor enabling sensor detection of user interactions with the surface. APPLE-1003, ¶¶131-132.

[1b-iii]

Murakoshi discloses that “*sensor 206 may include... an accelerometer.*” APPLE-1004, [0029], [0092]; APPLE-1003, ¶133.

[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, ¶¶134-137. For example, Murakoshi's pre-defined region (dotted blue) is formed on the vibratory surface (light blue), thus **overlaying** the mounting surface. APPLE-1003, ¶136. Additionally, both extend as planes in the X-Z directions and are thus **aligned**. APPLE-1003, ¶135.



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, ¶¶136-137.

[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, ¶¶138-139; §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, ¶139. 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, ¶¶138-139.

[1b-vi]

Murakoshi-Stewart tracks the ’738 patent’s preferred embodiment (*see* APPLE-1001, 5:11-13) 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, ¶¶140-142.

[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, ¶¶143-144.

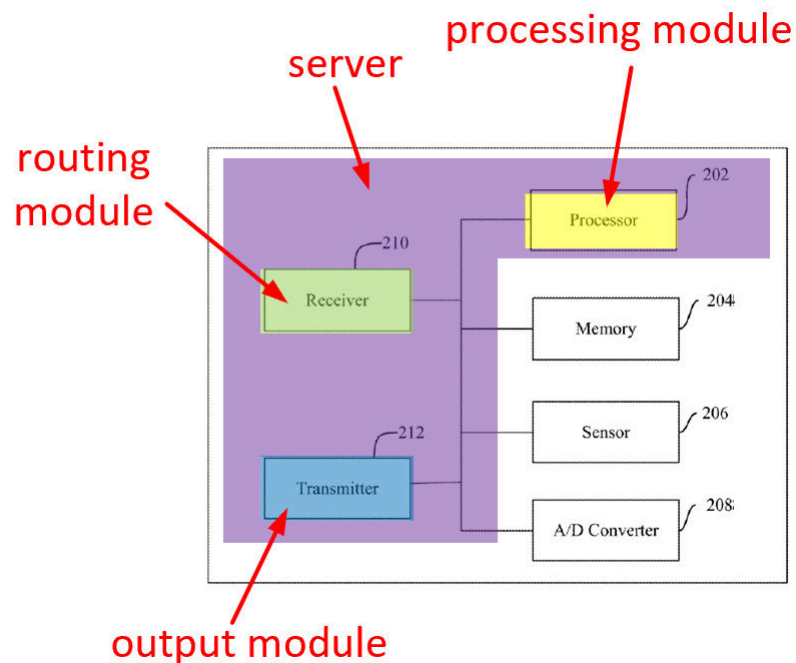
[1b-viii]

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, ¶145; §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, ¶145.

[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, ¶¶146-147.



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, ¶148.

[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, ¶149.

[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, ¶150.

[1c-v]

A POSITA would have understood from Murakoshi that the server, under Haptic’s interpretation as evidenced by the infringement contentions, 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-1101, 20-28, 54-60; APPLE-1003, ¶¶151-152.

[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, ¶¶153-156. 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, ¶¶153-154.

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, ¶154. 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, ¶¶153-156.

[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, ¶¶157-158.

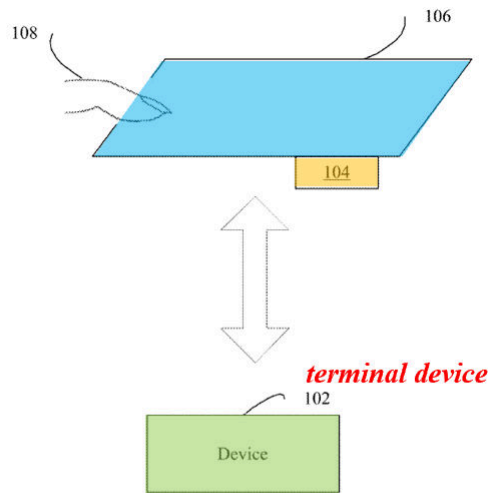


FIG. 1

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, ¶159.

[1d-iii]

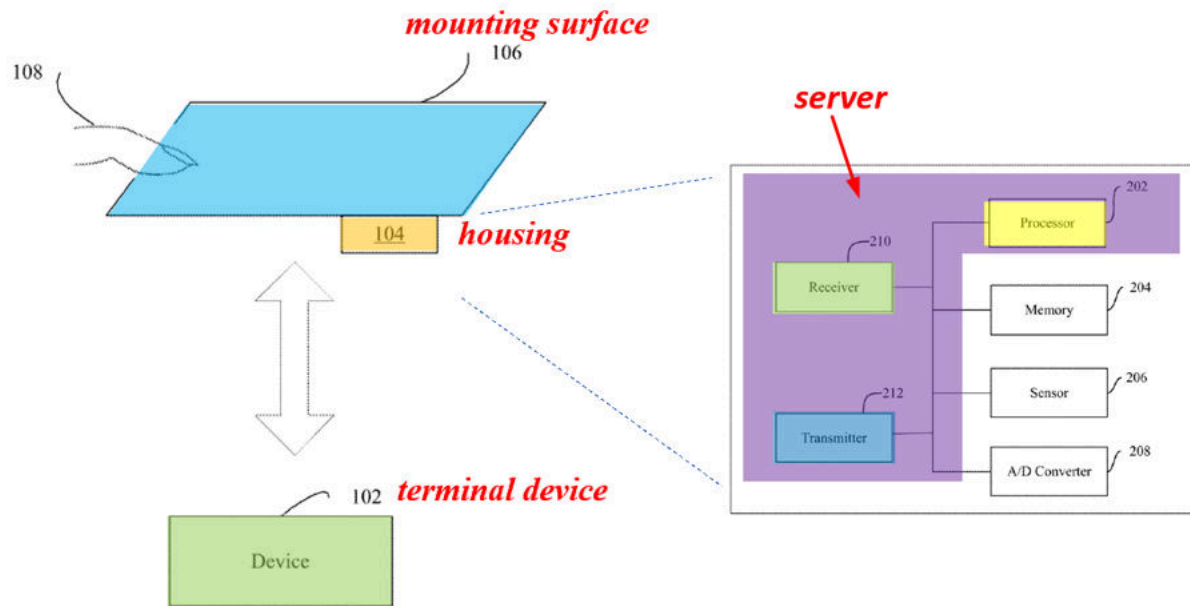
Murakoshi-Stewart renders obvious “means for initiating activity” (switch or actuating mechanism) of each terminal device that initiates activity of said terminal device corresponding to said command. APPLE-1003, ¶¶160-163.

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, ¶¶161-162. 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. *Id.*

[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, ¶¶163-164.



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, ¶¶163-164.

[1d-v]

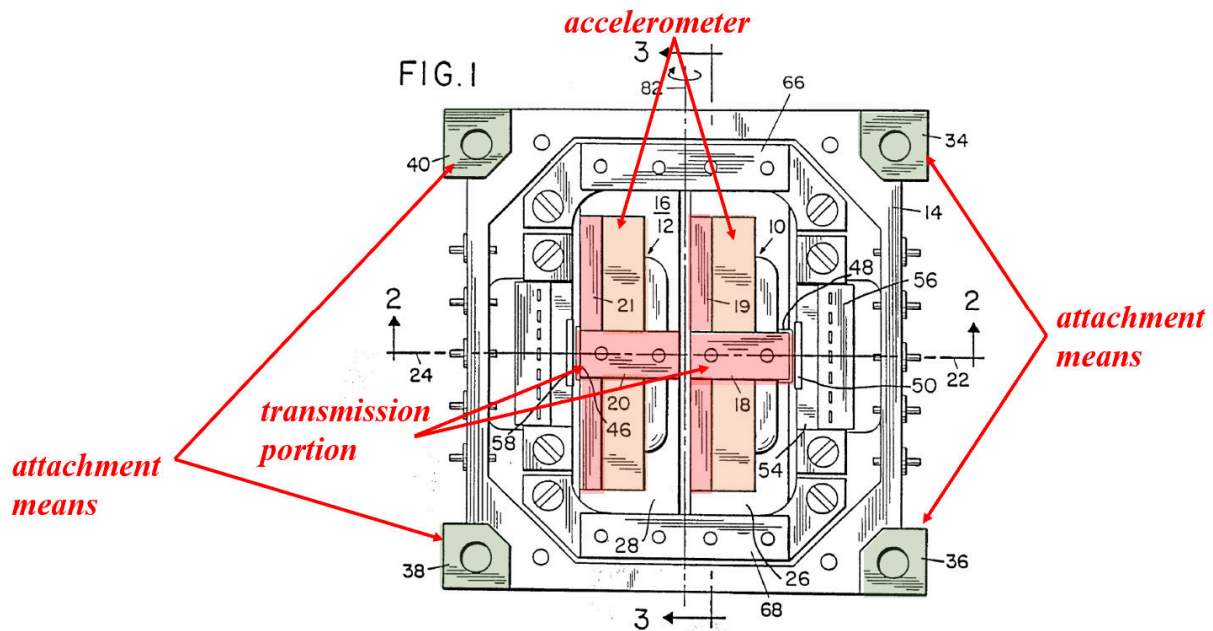
Murakoshi-Stewart renders [1d-v] obvious based on Murakoshi’s disclosure of a transmitter (output module) that outputs and transmits a command to processors and/or circuits (receiving module) of a terminal device to control the

device. §IV.A.4.[1c-iv]; APPLE-1004, [0026]; APPLE-1003, ¶¶165-166.

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, ¶¶165-166.

[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, ¶¶167-168; §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, ¶169.

Murakoshi-Stewart’s brackets and case mounts with fasteners collectively perform the same function as the claimed “engagement means.” APPLE-1003, ¶¶167-177. 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, ¶¶167-171; §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, ¶¶167-171, 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, ¶¶172-173. 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, ¶173.

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, ¶¶174-177; 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, ¶¶167-177.

[3a] wherein said transmission portion is comprised of a spring loaded portion so as to reduce damping of said contact interaction.

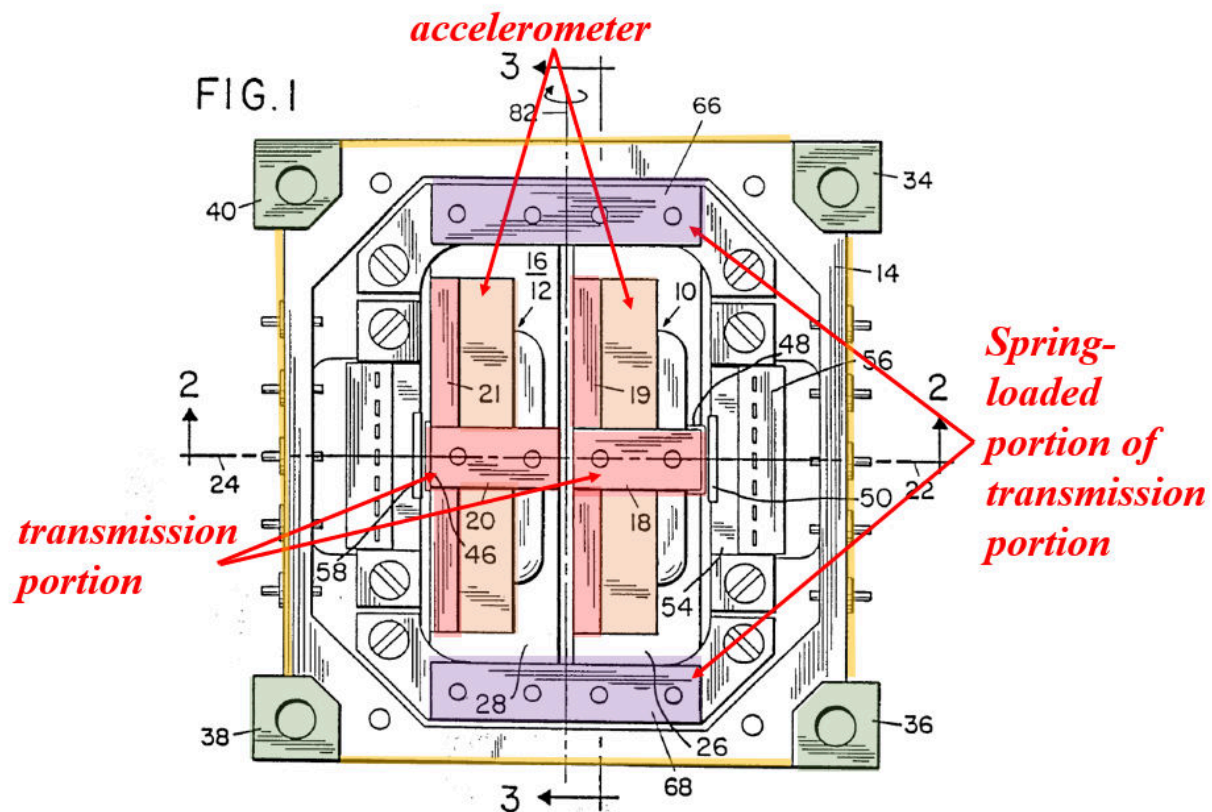
Murakoshi-Stewart renders obvious a transmission portion including a spring loaded portion to reduce damping of the contact interaction. APPLE-1003,

¶¶178-184. The '738 patent does not describe or illustrate the structures associated with the claimed “spring loaded portion.” APPLE-1001, 7:8-9 (“the transmission portion 28 can be ... a spring loaded portion (not shown) so as to reduce damping”), 8:25-26 (“In the embodiment with the spring loaded portion (not shown)...”); APPLE-1003, ¶¶179. The '738 patent merely describes that “the spring loaded portion of the transmission portion 28 has less damping than the mounting surface 22 or surface of the contact interaction.” APPLE-1001, 8:26-28. “[T]he spring loaded portion as the transmission portion 28 may hold the housing 20 closer and stronger to the mounting surface 22 so as to reduce damping sound or vibration of contact interaction.” *Id.*, 8:31-35.

Although Murakoshi does not explicitly disclose a spring loaded portion attaching the sensor to the housing, Murakoshi does explain that the housing—and the sensor—should be fixed in position relative to the vibratory surface. APPLE-1004, [0030] (“the sensor 206 may be an integral part of the apparatus...[and] apparatus 104 may be coupled to the vibratory surface 106 in such a manner that the sensor 206 may be in contact with the vibratory surface 106” or “sensor 206 may be coupled to and/or embedded in the vibratory surface”); *see also id.*, [0021]; APPLE-1003, ¶180. A POSITA would have been motivated to look to similar references, like Stewart, that explain how to attach an accelerometer within a housing and the housing to a surface to secure the sensor with respect to

the surface, as Murakoshi instructs. APPLE-1003, ¶180.

Stewart discloses that the accelerometer is fixed in the housing using a bracket assembly (transmission portion) including support flexures that allow the sidebeams to move (e.g., spring loaded) in response to vibrations to affect the vibratory sensor motion (to reduce damping of the contact interaction). APPLE-1006, 5:8-20, 5:54-61; APPLE-1003, ¶181.



APPLE-1006, Fig. 1 (annotated)

In particular, Stewart describes that “the accelerometer 10 is held between sidewalls 25 and 26 by the spaced apart fingers 18 and 30” and “sidebeams 25 and

26...are attached to the opposed beam support flexures 66 and 68.” APPLE-1006, 5:55-58; *see also id.*, 10:11-17, Figs. 8-11; APPLE-1003, ¶182. Stewart discloses that the accelerometer is held in a position using brackets (transmission portion) coupled to support flexures attaching the accelerometer within the casing so that the accelerometer is protected and held in a position such that it can sense vibrations efficiently and without interference. APPLE-1006, 5:9-11, 5:62-6:19; APPLE-1003, ¶¶182, 39-43.

A POSITA would have found it obvious based on Stewart’s disclosure, that in implementing the apparatus, per Murakoshi, with Stewart’s teaching to use brackets to attach the accelerometer, the accelerometer would have been coupled to the casing by a spring-loaded portion – such as a flexural element. APPLE-1003, ¶183. A POSITA would have been motivated to do so because supporting the sensing mass member using flexural beams reduces dampening of vibrations associated with the user impact on the vibratory surface by enhancing the displacement of the sensing mass member in response to the vibrations. APPLE-1006, 10:4-17, 11:60-65; APPLE-1003, ¶¶183, 39-43. It would have been well within the skill level of a POSITA to implement the apparatus with Stewart’s teaching, and a POSITA would have done so with a reasonable expectation of success because it was well-known to use hinges, cantilevers, and other spring-loaded mechanisms to position accelerometers within housings to optimize

sensing of vibrations by the Critical Date. APPLE-1003, ¶¶183, 39-43.

The preferred embodiment of the '738 patent is a “spring loaded portion of the transmission portion 28” which “has less damping than the mounting surface 22 or surface of the contact interaction” and may hold the housing 20 closer and stronger to the mounting surface 22 so as to reduce damping sound or vibration of contact interaction.” APPLE-1001, 8:26-35. Murakoshi-Stewart meets at least this preferred embodiment because it includes support flexures for securing the sensor to the housing (i.e., are part of the transmission portion) that strongly holds the sensor to the mounting surface, reducing damping of vibrations, while allowing the sensor to move in order to sense the vibrations (i.e., spring-loaded). APPLE-1003, ¶184.

b) Claim 6

[6pre] The control system, according to claim 1,

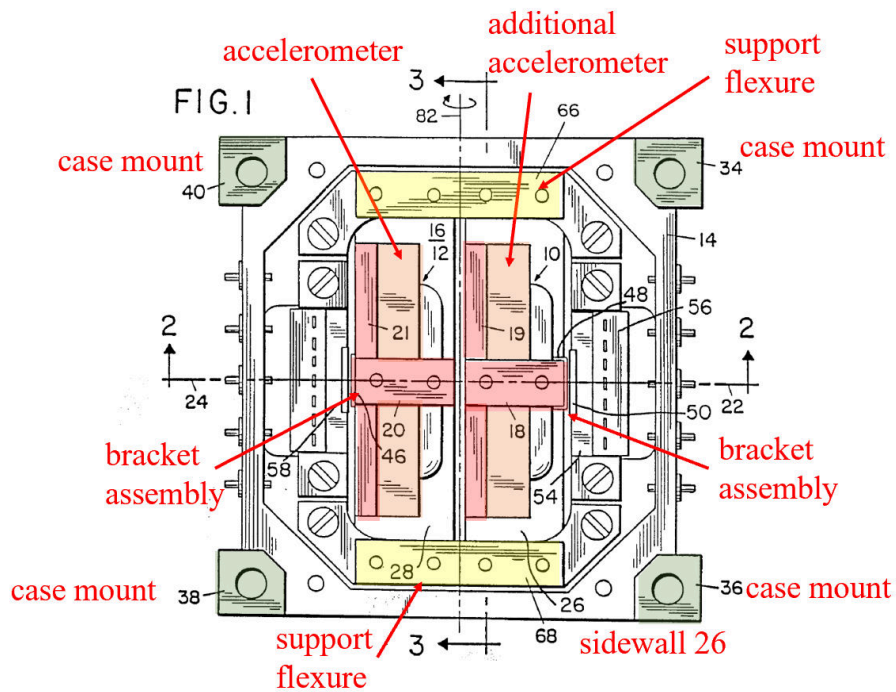
For the reasons explained above, Murakoshi-Stewart render obvious the control system of claim 1. *Supra* §§IV.A.4.[3pre] (Discussion of Claim 1 Elements); APPLE-1003, ¶¶185, 123-177.

[6a-i] further comprising: an additional sensor contained within said housing,

Murakoshi discloses that the apparatus can include one or more sensors (accelerometers), and Stewart discloses how to mount a second accelerometer within a housing (additional sensor contained within the housing). APPLE-1004,

[0089]; APPLE-1006, 5:8-61; APPLE-1003, ¶¶. For example, Murakoshi describes “an apparatus 104... for controlling a user interface of a device 102... may comprise one or more sensors...[t]he one or more sensors may be operable to detect one or more vibrations of the vibratory surface 106 caused by an interaction of an object 108... with the vibratory surface.” APPLE-1004, [0089]. Murakoshi describes that the signals detected by each sensor can be processed “to determine a location that corresponds to the interaction of the object with the vibratory surface 106.” APPLE-1004, [0089]-[0090]; APPLE-1003, ¶¶186-188. Additional sensors provide additional information about an object’s interaction with the vibratory surface that can be used to further distinguish between a user’s intended commands (e.g., a location of an interaction or direction of interaction can allow for a greater number of distinct commands). APPLE-1004, [0090], [0092]; APPLE-1003, ¶¶186-187.

A POSITA would have been motivated to look to other similar references, such as Stewart, describing how to mount multiple accelerometers within a device housing. APPLE-1003, ¶188. Stewart describes a vibrating multisensor using two accelerometers (additional sensor) and provides details of mounting the two accelerometers within the housing using brackets and other components (said additional sensor being in a fixed position relative to said engagement means). APPLE-1006, 5:8-13, 5:54-61 (“accelerometers 10 and 12”); APPLE-1003, ¶188.



APPLE-1006, Fig. 1 (annotated)

A POSITA would have been motivated by Murakoshi's disclosure of one or more sensors in the apparatus providing additional information about a contact interaction to implement Murakoshi-Stewart with multiple accelerometers mounted within a housing, per Murakoshi, using mounting structures as Stewart describes (brackets, support flexures, sidewalls). APPLE-1004, [0089]; APPLE-1006, 5:8-61; APPLE-1003, ¶189.

[6a-ii] said additional sensor forming an additional interactive zone defined by an additional range of said additional sensor,

A POSITA would have appreciated that, after it included the additional sensor (e.g., accelerometers) within the housing, it would be in a fixed position relative to said engagement means, and that the additional sensor would function

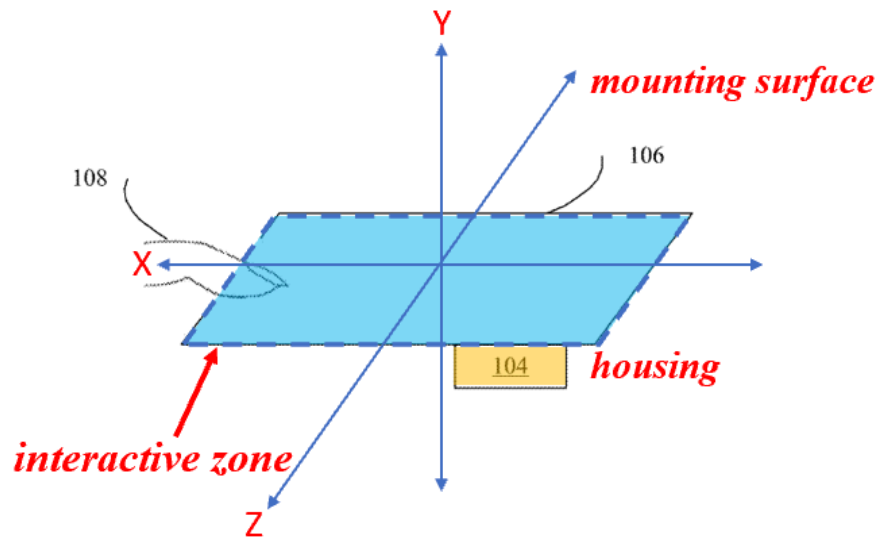
in the same way as the first sensor, including having its own interactive zone aligned with the mounting surface. APPLE-1003, ¶¶190-192. Murakoshi describes that “[t]he one or more sensors may be operable to detect one or more vibrations of the vibratory surface 106 caused by an interaction of an object 108 ... with the vibratory surface 106.” APPLE-1004, [0089]. Because each of the sensors are positioned within the housing, the range of each sensor would be slightly different resulting in at least a slight difference in interactive zone of the sensor (e.g., a first interactive zone defined by a range of the first sensor, and a second, additional, interactive zone defined by a range of the additional sensor). APPLE-1003, ¶191. Although there would likely be overlap in the interactive zone in which each sensor detects vibrations, because the sensors are positioned side by side (horizontally and parallel to the vibratory surface) in Murakoshi-Stewart, the interactive zones would differ at least at the outside edges. APPLE-1003, ¶¶191-192; *see also* APPLE-1001, Fig. 6 (showing two sensors 30, 130 within an apparatus 20 having largely overlapping interactive zones). A POSITA would have appreciated that each of Murakoshi’s sensors would have detected vibrations of a vibratory (mounting) surface within “a pre-defined region” (interactive zone) within the range of each of the sensors. APPLE-1004, [0021], [0013], [0016], Fig. 1; APPLE-1003, ¶¶190-192.

Additionally, “it is well settled that the mere duplication of parts has no

patentable significance unless a new and unexpected result is produced.” *In re Harza*, 274F.2d 669, 671 (C.C.P.A. 1960). Here, the duplication of the sensor has no significance and would have been obvious to a POSITA. APPLE-1003, ¶192.

[6a-iii] said additional interactive zone being aligned with said mounting surface,

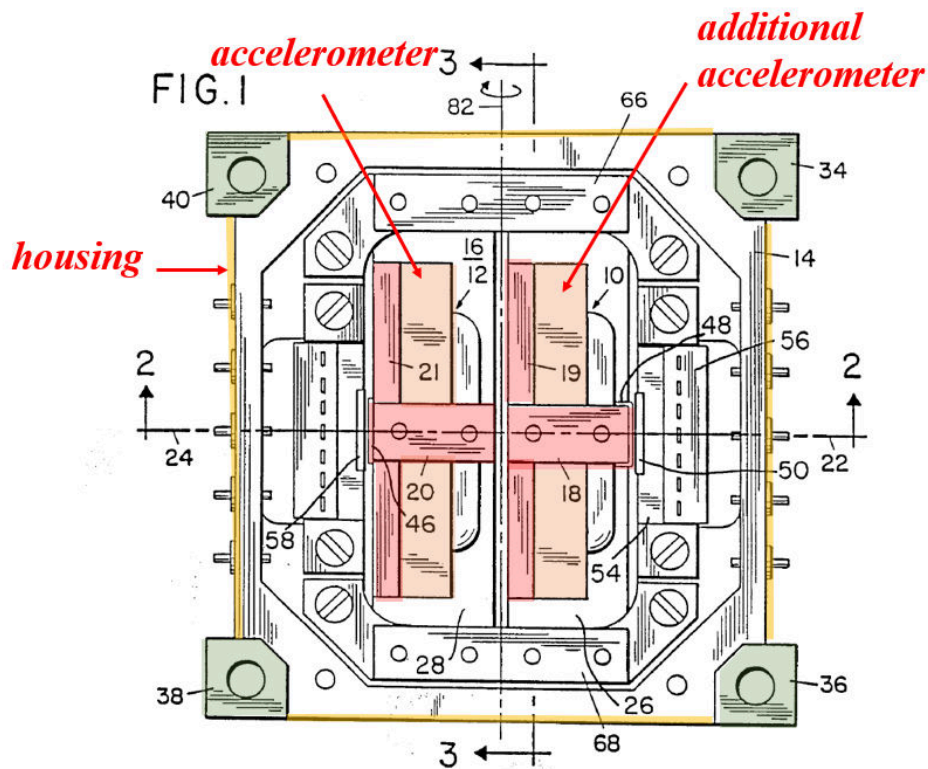
As described in [1b-iv], under Haptic’s construction (§III), Murakoshi discloses that the interactive zone aligns with the mounting surface, as shown in Fig. 1 below. §IV.A.4.[1b-iv]; APPLE-1004, [0020]-[0021]; APPLE-1003, ¶¶193-195.



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

A POSITA would have understood that two accelerometers, mounted within the apparatus casing, as Stewart teaches, would each have an interactive zone within range of the sensor enabling sensor detection of user interactions with

the surface. *Supra* §IV.A.4.[6a-ii]; APPLE-1003, ¶194. In Murakoshi-Stewart, the two accelerometers are positioned side-by-side and aligned in the same direction and manner, as illustrated below. *See* APPLE-1006, Fig. 1; APPLE-1003, ¶194.



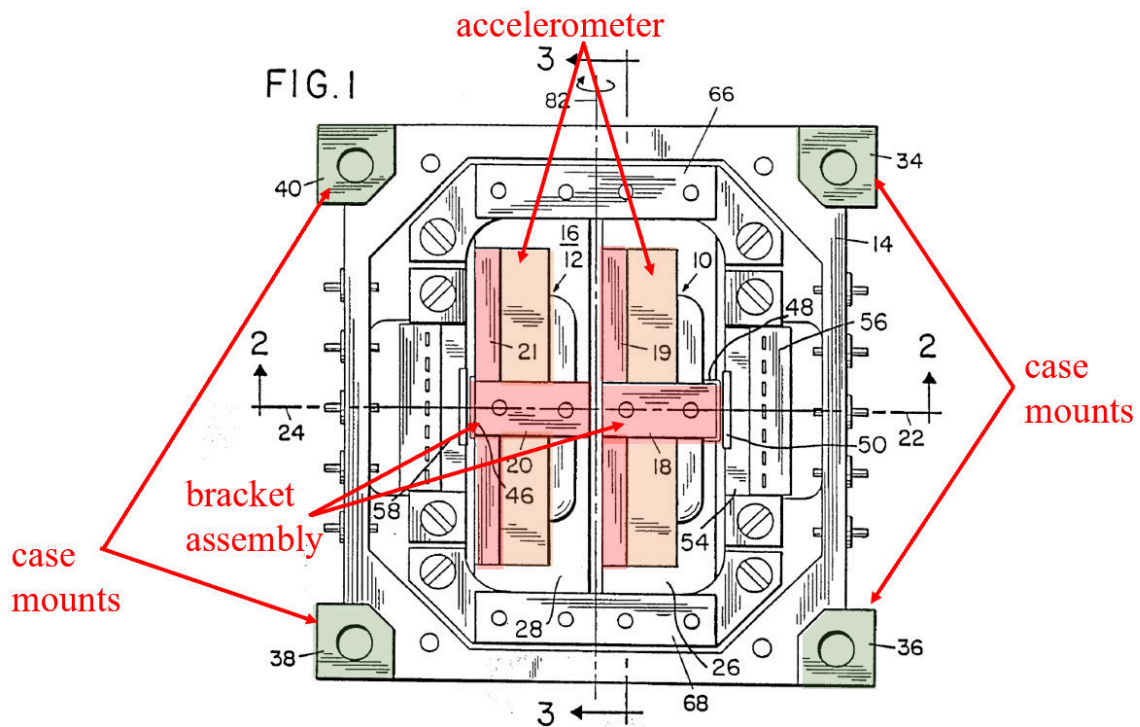
APPLE-1006, Fig. 1 (annotated)

As a result of the orientation and alignment of the two accelerometers coupled in the housing by a bracket, per Stewart, the additional interactive zone defined by the range of the second accelerometer is aligned in the same direction as the interactive zone defined by the range of the first accelerometer, such that the additional interactive zone is aligned with the mounting surface in the same

way as the first interactive zone. *Supra* §IV.A.4.[1b-ii]-[1b-iv]; APPLE-1003, ¶¶195, 131-137. Accordingly, the interactive zone associated with the additional sensor would also be aligned with the mounting surface as illustrated above. APPLE-1003, ¶¶193-195.

[6a-iv] said additional sensor being in a fixed position relative to said engagement means,

A POSITA would have appreciated that Murakoshi-Stewart's additional sensor is contained within the housing and is in a fixed position relative to said engagement means by a bracket assembly, per Stewart. *Supra* §IV.A.4.[1b-v]; APPLE-1004, [0021] ("the apparatus 104 may be fixed on the vibratory surface"), [0030] ("the sensor 206 may be an integral part of the apparatus 104"); APPLE-1006, 5:8-37 (describing bracket assembly holding accelerometers 10 and 12 within the casing), 5:54-61, Fig. 1; APPLE-1003, ¶¶196-197, 138-139.



APPLE-1006, Fig. 1 (annotated)

The bracket assembly described by Stewart fixes the accelerometers (including the additional accelerometer) within the casing and relative to the brackets and case mounts (i.e. engagement means). *Id.*, 5:8-12 (“the accelerometers are positioned within a cavity 16 within the case 14 [and] attached to a three-part bracket assembly”), 5:34-37 (describing “case mounts 34, 36, 38, 40”), FIG. 1; APPLE-1003, ¶197.

[6a-v] said server being in communication with said additional sensor,

Murakoshi-Stewart’s additional accelerometer is in communication with the server via the receiver (routing module of the server). APPLE-1004, [0089];

APPLE-1003, ¶¶198-200. In particular, Murakoshi describes that “[t]he one or more sensors may be operable to detect one or more vibrations of the vibratory surface [and] generate one or more vibratory signals in response to the detected one or more vibrations.” APPLE-1004, [0089]. Further, “[t]he apparatus 104 may further comprise one or more processors, such as a processor 202 (FIG. 2) communicatively coupled to the one or more sensors.” *Id.*

Murakoshi describes that the receiver “receive[s] the vibratory signal generated by the sensor” before the signal is processed APPLE-1004, [0032], [0025]-[0026], [0018], [0089], Fig. 2; APPLE-1003, ¶¶198-199. As described above, in Murakoshi-Stewart, the processor and receiver are components of the server. §§IV.A.4.[1c-i]-[1c-iii]; APPLE-1003, ¶¶199, 146-149. A POSITA would have understood from Murakoshi’s disclosure that the server is in communication with the additional sensor, based on Murakoshi’s disclosure that the “one or more sensors” detect vibrations and transmits a signal to the processor via the receiver “in response to the detected one or more vibrations.” APPLE-1004, [0089], [0032], FIG. 2; APPLE-1003, ¶200.

[6b] wherein said contact interaction with said mounting surface within said additional interactive zone is detected by said additional sensor as additional data signals,

As described above, Murakoshi describes an apparatus including one or more sensors for detecting vibrations (data signals) of a vibratory surface.

APPLE-1004, [0089] (“The *one or more sensors* may be operable to *detect one or more vibrations of the vibratory surface 106* caused by an *interaction of an object 108* (FIG. 1) with the vibratory surface 106”), [0013], [0016]; APPLE-1003, ¶¶201, 129-144; §IV.A.4.[1b-i]-[1b-vi]. A POSITA would have understood from Murakoshi’s disclosure that each of the accelerometers (e.g., the additional sensor) detects vibrations of the mounting surface, and that the vibrations are detected by each accelerometer as a data signal. APPLE-1004, [0089] (“The one or more sensors may be operable to generate one or more vibratory signals in response to the detected one or more vibrations”); APPLE-1003, ¶201.

[6c] wherein said processing module determines said data pattern corresponding to said data signals of said sensor and said additional data signals of said additional sensor.

Murakoshi describes processing each of the detected vibratory signals to control an apparatus. APPLE-1004, [0090] (“The one or more processors may be operable to convert each of the generated one or more vibratory signals into *vibratory signal components*”); [0089], [0093]; APPLE-1003, ¶¶202-203. As described above in Elements [1c-iii] and [1c-vi], a POSITA would have understood from Murakoshi’s disclosure that the processor includes suitable logic, circuitry, and/or interfaces that allow it to determine the vibratory signal components (i.e., determine a data pattern). APPLE-1004, [0013], [0015], [0038], [0082]; APPLE-1003, ¶¶202, 149, 153-156; §IV.A.4.[1c-iii] and [1c-vi]. In

particular, Murakoshi discloses that, in a system having multiple sensors, the processor can determine a location or type of interaction with the vibratory surface from the vibration data detected by the sensors. APPLE-1004, [0090], [0015]. A POSITA would have understood from Murakoshi's disclosure that the Murakoshi-Stewart processor determines a data pattern including the vibration data detected from each of multiple accelerometers in an apparatus. APPLE-1004, [0015], [0040], [0090]: APPLE-1003, ¶203.

c) Claim 7

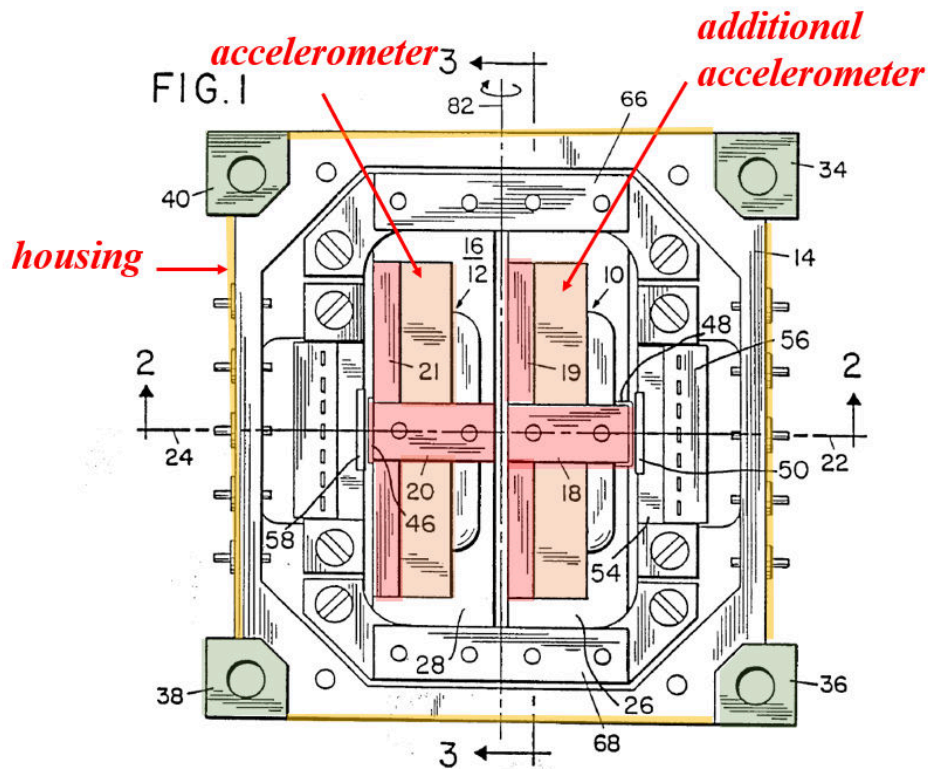
[7pre] The control system, according to claim 6,

As described above, Murakoshi-Stewart render obvious the control system of claim 6. *Supra* §§IV.A.4.[3pre] (Discussion of Claim 1 Elements); APPLE-1003, ¶¶204, 123-177.

[7a] wherein said interactive zone of said sensor overlaps with said additional interactive zone of said additional sensor.

A POSITA would have understood that, by positioning two accelerometers (disclosed by Murakoshi) within the Murakoshi-Stewart apparatus according to the teachings of Stewart, the two accelerometers would be positioned within a single plane and spaced apart from one another in the plane, and that the two accelerometers would therefore have overlapping interactive zones in which the sensors can detect vibrations resulting from a user impact with a mounting surface. *Supra* §IV.A.4.[6a-ii]; APPLE-1006, Abstract, 5:8-13, Abstract; APPLE-

1004, [0089], [0014]; APPLE-1003, ¶¶205-206, 190-192.



APPLE-1006, Fig. 1 (annotated)

Accordingly, a POSITA would have understood that the sensors would each have their own interactive zone and that, depending on the separation between the sensors and the range of each sensor, the interactive zones would overlap.

APPLE-1003, ¶¶205-206; *see also* APPLE-1001, Fig. 6 (showing two sensors 30, 130 within an apparatus 20 having largely overlapping interactive zones). It would have been obvious to a POSITA to position the two sensors so that the interactive zone of each would overlap to allow the sensors to be able to detect user interactions with the vibratory surface and to more easily detect

characteristics of the user interaction, such as a location of the contact with the surface. APPLE-1004, [0089]-[0090]; APPLE-1003, ¶206.

d) Claim 12

[12pre] The method of controlling the terminal device, according to claim 10,⁷

Claim 12 is a method claim depending from independent claim 10.

Although claim 10 is written as a method claim, the limitations [10pre]-[10k-i] of claim 10 correspond substantially to the limitations of claim 1. Accordingly, Murakoshi-Stewart render obvious the method of controlling the terminal device of claim 10 for at least the following reasons (with reference to the explanation of why the control system of claim 1 is rendered obvious by the combination).

Supra §IV.A.4.[3pre] (Discussion of Claim 1 Elements); APPLE-1003, ¶¶207-208, 123-177.

[10pre]-[10k-i]

See [1pre]-[1e] (Ground 1A). *Supra* §§IV.A.4.[1pre]-[1e]; APPLE-1003, ¶¶209-211, 123-177.

[10k-ii]

Murakoshi discloses that the control signal (command) indicates an

⁷ 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.

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, ¶¶212-213. Accordingly, in Murakoshi-Stewart, the control signal transmitted to the terminal device specifies an activity of the terminal device, such as turning on or off. APPLE-1003, ¶¶212-213.

[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] (“Based on the received control signal, the mobile phone 502 may be switched off”); APPLE-1003, ¶¶214-215. Accordingly, in Murakoshi-Stewart, when the terminal device receives the control signal (command) the terminal device performs that activity associated with the control signal, like turning on or off. APPLE-1003, ¶¶214-215.

[12a] wherein said housing is further comprised of an additional sensor, said additional sensor being connected to said server,

Murakoshi-Stewart renders element [12a] obvious for the same reasons discussed for elements [6a-i] and [6a-v]. *Supra* §IV.A.4.[6a], [6a-v]; APPLE-

1006, [0089]; APPLE-1003, ¶¶216, 186-189, 198-200.

[12b] wherein the step of detecting said contact interaction as data signals with said sensor further comprises detecting said contact interaction as additional data signals with said additional sensor;

Murakoshi-Stewart renders element [12b] obvious for the same reasons discussed for elements [6b]. *Supra* §IV.A.4.[6b]; APPLE-1006, [0089]; APPLE-1003, ¶¶217, 201, 129-144.

[12c] wherein the step of receiving said data signals from said sensor with said routing module further comprises receiving said additional data signals from said additional sensor with said routing module, and

Murakoshi discloses that, in a system with more than one sensor, each sensor detects vibrations (data signals) and generates a vibratory signal to be transmitted to the processor via the receiver (routing module) for processing. APPLE-1004, [0089] (“The one or more sensors may be operable to generate one or more vibratory signals in response to the detected one or more vibrations”), [0090] (“The one or more processors may be operable to convert each of the generated one or more vibratory signals into vibratory signal components”), [0093]; APPLE-1003, ¶¶218-219. It would have been obvious to a POSITA that signals from the “one or more sensors” are transmitted to the processor in the same manner as described above with regard to Element [1c-v]. §IV.A.4.[1c-v]; APPLE-1003, ¶¶218-219, 151-152. That is, in Murakoshi-Stewart, the receiver “receive[s] the vibratory signal generated by the sensor,” including the vibratory

signal generated by the additional sensor. APPLE-1004, [0032], [0025]-[0026], [0018], [0089]; APPLE-1003, ¶¶218-219.

[12d] wherein the step of determining said data pattern further comprises determining said data pattern corresponding to said data signals and said additional data signals with said processing module.

Murakoshi-Stewart renders element [12d] obvious for the same reasons discussed for element [6c]. *Supra* §IV.A.4.[6c]; APPLE-1006, [0089]; APPLE-1003, ¶¶220, 202-203, 149, 153-156.

e) Claim 13

[13pre] The method of controlling the terminal device, according to claim 12,

As described above, Murakoshi-Stewart render obvious the method of controlling the terminal device of claim 10. *See* §IV.A.4.[12pre] (discussion of claim 10 elements); APPLE-1003, ¶¶221, 207-215, 123-177.

[13a] 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.

Murakoshi discloses that the interaction of the object with the vibratory surface (contact interaction) can be “a plurality of interactions” on the vibratory surface (mounting surface). APPLE-1004, [0022] (“tapping on the vibratory surface”), [0092] (“The interaction may comprise... tapping on the vibratory surface”), [0093] (same), [0050], [0035] (“a user may scratch and/or *tap at any location on the vibratory surface 106*”), [0015], [0022], [0035]; APPLE-1007,

[0112]; APPLE-1003, ¶¶222.

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]; APPL-1003, ¶¶224-228.

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, ¶¶229-233.

- 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, ¶234.
- 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, ¶236.
- 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, ¶235.
- 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, ¶237.

- 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, ¶238.
- 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, and, 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, ¶¶239-241.

3. Analysis

a) Claim 3

[3pre] The control system, according to claim 1,

Under Haptic's constructions of the relevant elements of claim 1, Murakoshi-Stewart-Sachs renders obvious the control system of claim 1, including each of the limitations of claim 1 as follows. APPLE-1003, ¶¶242-246.

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

See [1pre]-[1c-v] and [1d-i]-[1e] (Ground 1A). *Supra* §§IV.A.4. [1pre]-[1c-v] and [1d-i]-[1e]; APPLE-1003, ¶¶243, 123-152, 157-177.

[1c-vi]

Murakoshi-Stewart-Sachs renders [1c-vi] obvious for the reasons explained above (*supra* §IV.A.4.[1c-vi]) and additionally 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]; APPLE-1003, ¶¶244-246, 153-156. 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, ¶245. Sachs’ data features are used as the data pattern associated with a gesture for efficient matching of the gesture to the intended command. APPLE-1007, [0010], [0015], [0079]; APPLE-1003, ¶245.

Accordingly, under Haptic’s construction (§III), in Murakoshi-Stewart-Sachs, a processing module (*see supra* §IV.A.4.[1c-iii]) 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], [0038], [0015], [0023], [0025], [0027], [0036], [0048]; APPLE-1003, ¶¶244-246, 149.

[3a] wherein said transmission portion is comprised of a spring loaded portion so as to reduce damping of said contact interaction.

See claim element 3[a] (Ground 1A). *Supra* §IV.A.4.[3a]; APPLE-1003, ¶¶247-248, 178-184.

b) Claim 6

[6pre] The control system, according to claim 1,

As described above, Murakoshi-Stewart-Sachs render obvious the control system of claim 1. See §IV.B.3.[3pre] (Discussion of Claim 1 Elements); APPLE-1003, ¶¶249, 123-152, 157-177, 242-246.

[6a-i] further comprising: an additional sensor contained within said housing,

[6a-ii] said additional sensor forming an additional interactive zone defined by an additional range of said additional sensor,

[6a-iii] said additional interactive zone being aligned with said mounting surface,

[6a-iv] said additional sensor being in a fixed position relative to said engagement means,

[6a-v] said server being in communication with said additional sensor,

[6b] wherein said contact interaction with said mounting surface within said additional interactive zone is detected by said additional sensor as additional data signals,

See claim 6 elements [6a-i]-[6b] (Ground 1A). *Supra* §§IV.A.4.[6a-i]-[6b];

APPLE-1003, ¶¶250-251, 186-201.

[6c] wherein said processing module determines said data pattern corresponding to said data signals of said sensor and said additional data signals of said additional sensor.

As described above, a POSITA would have understood from Murakoshi's disclosure that each of the detected vibratory signals detected by the one or more accelerometers (i.e., the claimed sensor and claimed additional sensor) would be processed. APPLE-1004, [0090] ("The one or more processors may be operable to convert each of the generated one or more vibratory signals into **vibratory signal components**"); [0089], [0093]; APPLE-1003, ¶¶252-253. In Murakoshi-Stewart-Sachs, the processing of the detected signals from each of the sensors is processed to identify data features of each signal, per Sachs, to determine a data

pattern of each detected signal for comparison to mapped signals, per Murakoshi.

APPLE-1007, [0009]-[0010], [0015], [0101]; APPLE-1004, [0013], [0015],
[0038]-[0040], [0082], [0090]; APPLE-1003, ¶¶252-253.

c) Claim 7

[7pre] The control system, according to claim 6,

As described above, Murakoshi-Stewart-Sachs render obvious the control system of claim 1. *See* §IV.B.3.[3pre] (Discussion of Claim 1 Elements); APPLE-1003, ¶¶254.

[7a] wherein said interactive zone of said sensor overlaps with said additional interactive zone of said additional sensor.

See claim 7 (Ground 1A). *Supra* §IV.A.4.[7a]; APPLE-1003, ¶¶255-256.

d) Claim 12

[12pre] The method of controlling the terminal device, according to claim 10,

Claim 12 is a method claim depending from independent claim 10.

Although claim 10 is written as a method claim, the limitations [10pre]-[10k-i] of claim 10 correspond substantially to the limitations of claim 1. Accordingly, under Apple's constructions of the relevant elements of claim 1, Murakoshi-Stewart-Sachs render obvious the method of controlling the terminal device of claim 10 for at least the following reasons (with reference to the explanation of why the control system of claim 1 is rendered obvious by the combination).

Supra §IV.B.3.[3pre] (Discussion of Claim 1 Elements); APPLE-1003, ¶¶257-

259, 243-246, 123-152, 157-177.

[10pre]-[10c], [10e-ii]-[10g], [10k-ii]-[10l]

See [1pre]-[1e] (Ground 1B). *Supra* §IV.B.3.[1pre]-[1e]; APPLE-1003, ¶¶258-259, 242-246, 123-152, 157-177.

[10k-ii]-[10l]

See [10k-ii]-[10l] (Ground 1A). *Supra* §IV.A.4.[10k-ii]-[10l]; APPLE-1003, ¶¶258-259, 212-215.

[12a] wherein said housing is further comprised of an additional sensor, said additional sensor being connected to said server,

[12b] wherein the step of detecting said contact interaction as data signals with said sensor further comprises detecting said contact interaction as additional data signals with said additional sensor;

[12c] wherein the step of receiving said data signals from said sensor with said routing module further comprises receiving said additional data signals from said additional sensor with said routing module, and

Murakoshi-Stewart-Sachs renders elements [12a]-[12c] obvious for the same reasons discussed above in [12a]-[12c] (Ground 1A). *Supra* §IV.A.4.[12a]-[12c]; APPLE-1003, ¶¶260-261, 216-219.

[12d] wherein the step of determining said data pattern further comprises determining said data pattern corresponding to said data signals and said additional data signals with said processing module.

Murakoshi-Stewart renders element [12d] obvious for the same reasons discussed for element [6c]. *Supra* §IV.B.3.[6c]; APPLE-1003, ¶¶262-263, 252-253. A POSITA would have understood that in Murakoshi-Stewart-Sachs the

processing of the data signal (including the additional data signal detected by the additional sensor) to identify data features (data pattern), per Sachs, occurs at the processing module, per Murakoshi. APPLE-1006, [0089]; APPLE-1003, ¶¶262-263, 252-253.

e) Claim 13

[13pre] The method of controlling the terminal device, according to claim 12,

As described above, Murakoshi-Stewart-Sachs render obvious the method of controlling the terminal device of claim 10. *See* §IV.B.3.[12pre] (discussion of claim 10 elements); APPLE-1003, ¶¶264, 257-259, 243-246, 123-152, 157-177.

[13a] 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.

See claim 13 (Ground 1A). *Supra* §IV.A.4.[13a]; APPLE-1003, ¶¶265-266, 222. Additionally, in Stewart-Murakoshi-Sachs, physically impacting the mounting surface includes making a plurality of physical impacts, per Sachs. APPLE-1007, [0112] (“three tap gestures”); APPLE-1003, ¶¶265-266.

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, ¶¶268-269. “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.” *Id.*; *see id.*, [0031].

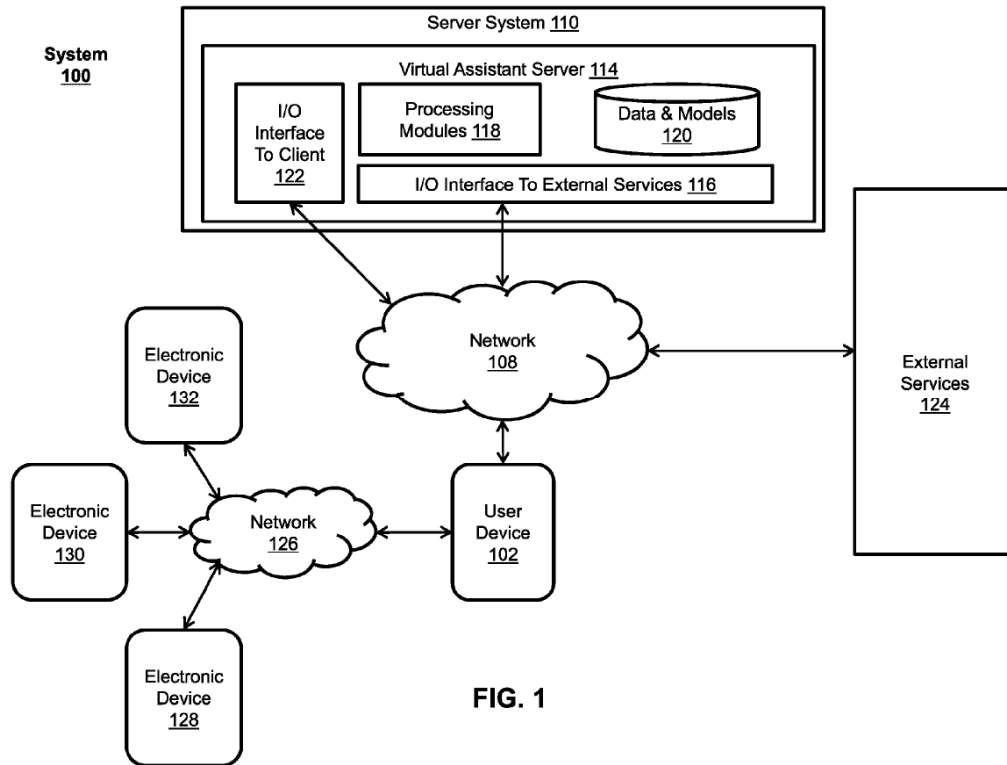


FIG. 1

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, ¶¶270-275; 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, ¶¶278-279; 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, ¶¶280-283 (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, ¶284.
- 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, ¶¶272, 275-277.
- 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, ¶285; *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, and, accordingly, a POSITA would have had a reasonable expectation of success in doing so for the reasons explained above. APPLE-1003, ¶¶286-287.

3. Analysis

a) Claim 3

[3pre] The control system, according to claim 1,

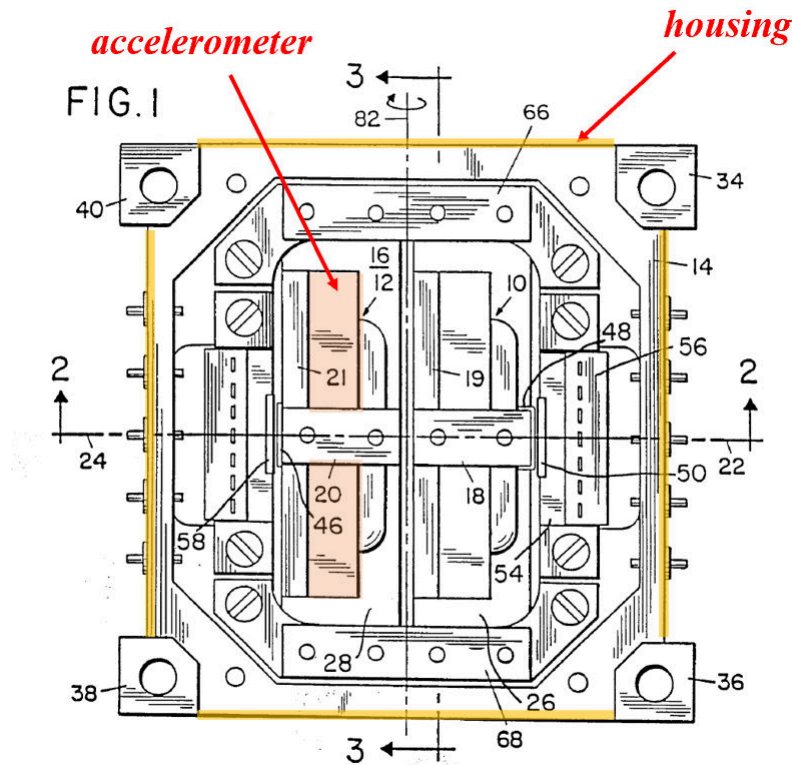
Under Apple's constructions of the relevant elements of claim 1, Murakoshi-Stewart-Sachs-Orr renders obvious the control system of claim 1, including each of the limitations of claim 1 as follows. APPLE-1003, ¶¶288-340.

[1pre]

See [1pre] (Ground 1A). APPLE-1003, ¶¶289, 123-124; §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, ¶¶290-294; §§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, ¶¶291-293. In modified Figure 1, below, the apparatus (orange) is positioned on the vibratory surface (blue). APPLE-1003, ¶¶291-293.

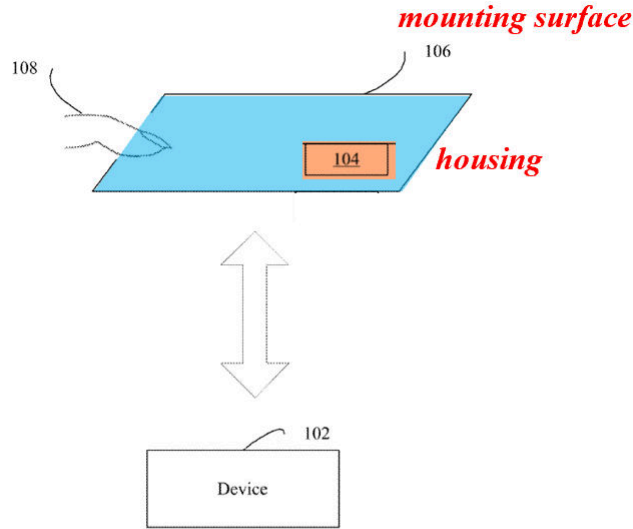
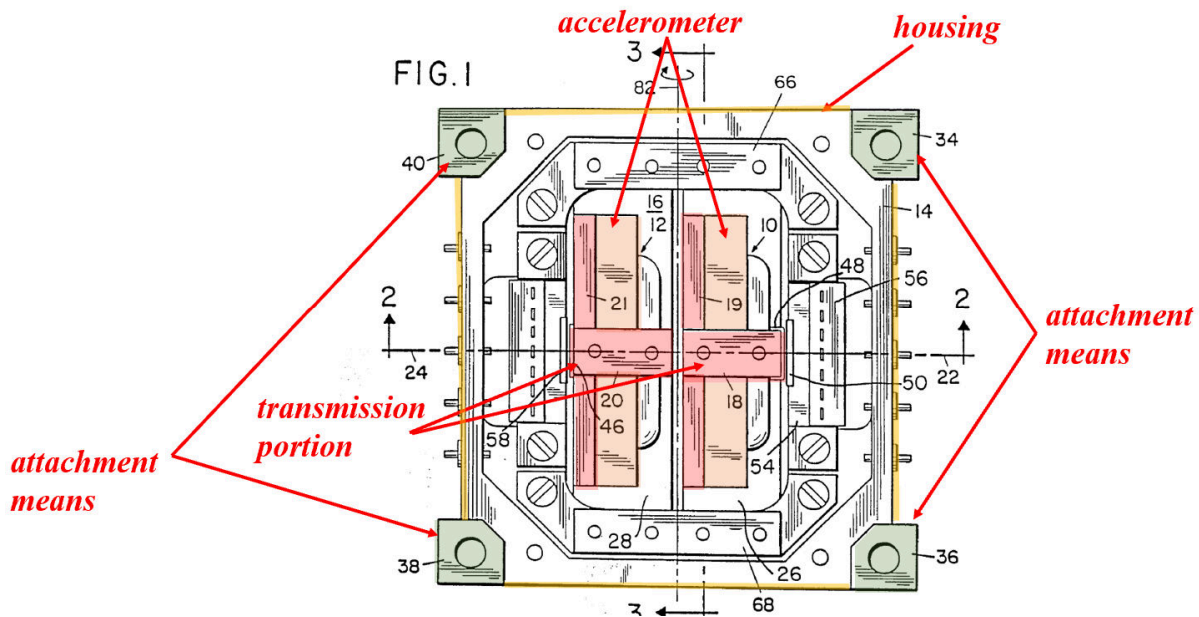


FIG. 1

APPLE-1004, Fig. 1 (annotated; modified)⁸

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, ¶¶290-294. A detailed §112(f) analysis for the “engagement means” element is provided in [1e].

⁸ 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, ¶¶295, 129-130; §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, ¶¶296-297.

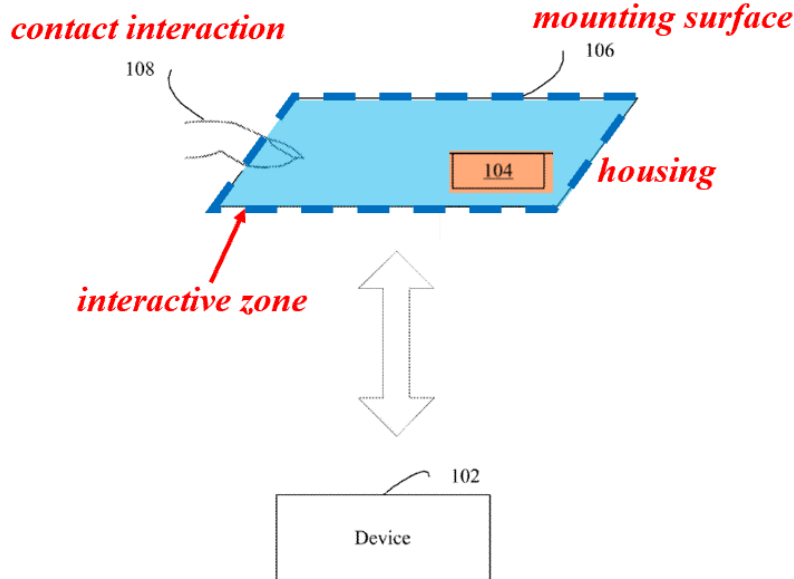


FIG. 1

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

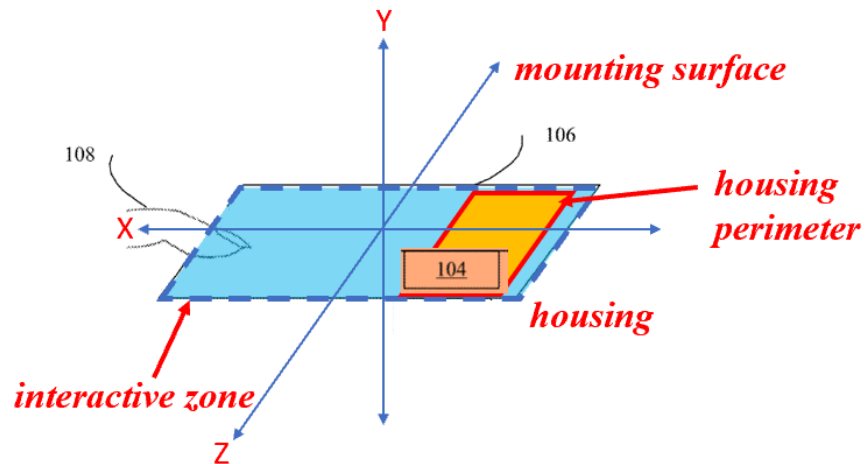
A POSITA would have understood that the pre-defined region of the vibratory surface, per Murakoshi, defines a zone within the sensor's range so a user's interactions with the surface within the pre-defined zone can be detected by the sensor and used to control device, even when the sensor is positioned on top of the surface, as Murakoshi teaches is an acceptable placement. APPLE-1004, [0034]; APPLE-1003, ¶¶296-297.

[1b-iii]

See [1b-iii] (Ground 1A). APPLE-1003, ¶¶298, 133; §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, ¶¶299-300.



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, ¶301.

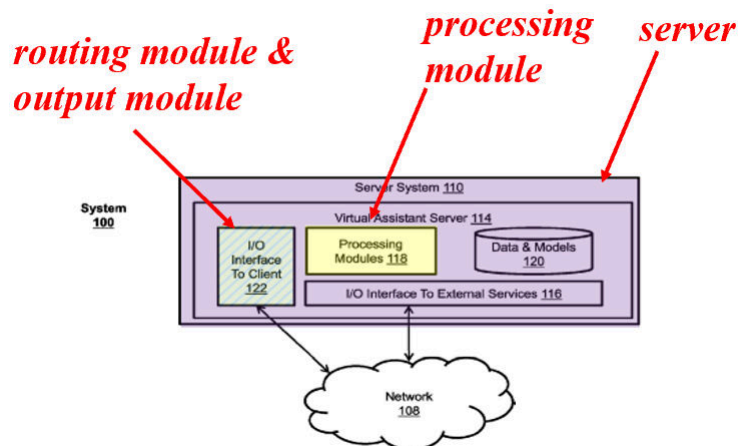
[1b-v]-[1b-viii]

See [1b-v]-[1b-viii] (Ground 1A). APPLE-1003, ¶¶302, 138-145;

§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, ¶¶307-308.



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, ¶¶146-147.

[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, ¶309. 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, ¶310. A detailed §112(f) analysis for the “processing module” element is provided below in [1c-vi].

[1c-iv]

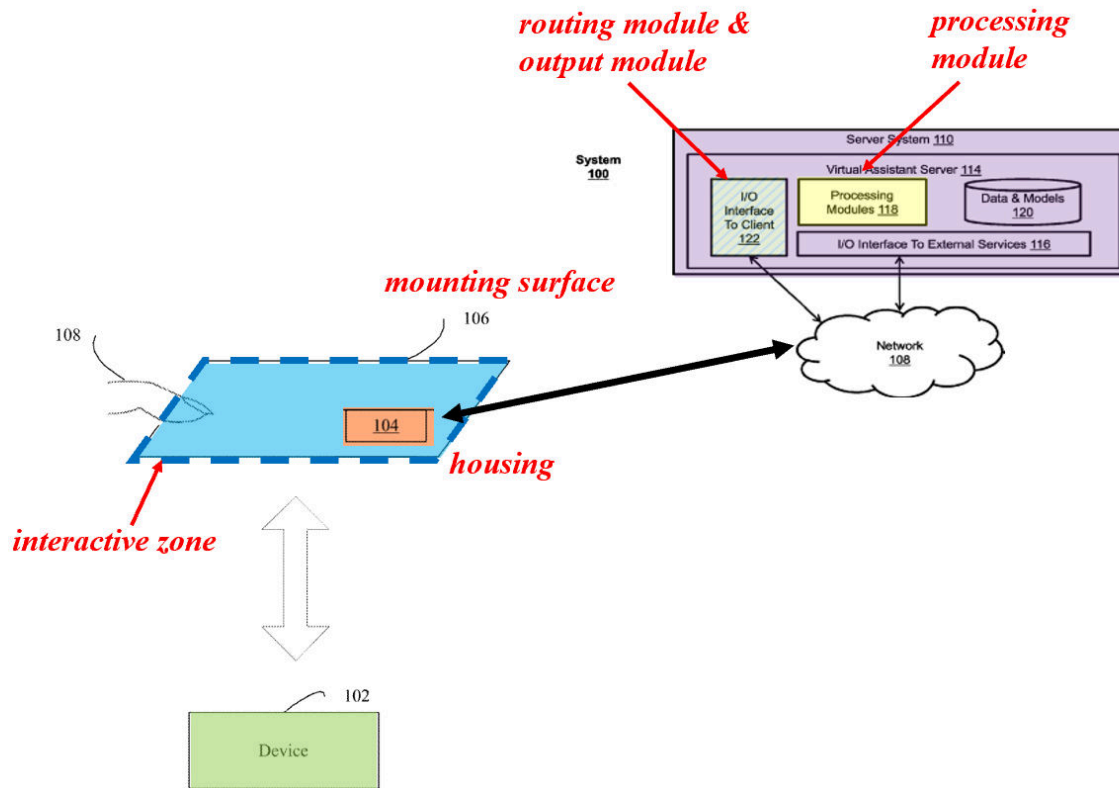
Applying Apple’s construction (§III), Murakoshi-Stewart-Sachs-Orr renders obvious an “output module” based on Orr’s disclosure of an I/O interface, which a POSITA would have understood acts as a transmitter, per Murakoshi, and is connected to the processing module (see Fig. 1, above). APPLE-1004, [0026], [0048]; APPLE-1005, [0028], [0049], [0062], [0056], [0081], [0091]-[0092], Figs. 7-9; APPLE-1003, ¶311. 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, ¶¶312-315.

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, ¶¶313-314.

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, ¶314.



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, ¶315. 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, ¶315. 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, ¶¶312-315.

[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, ¶¶316-320.

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, ¶¶317-318. 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, ¶318.

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, ¶319. 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, ¶320. 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, ¶¶316-320.

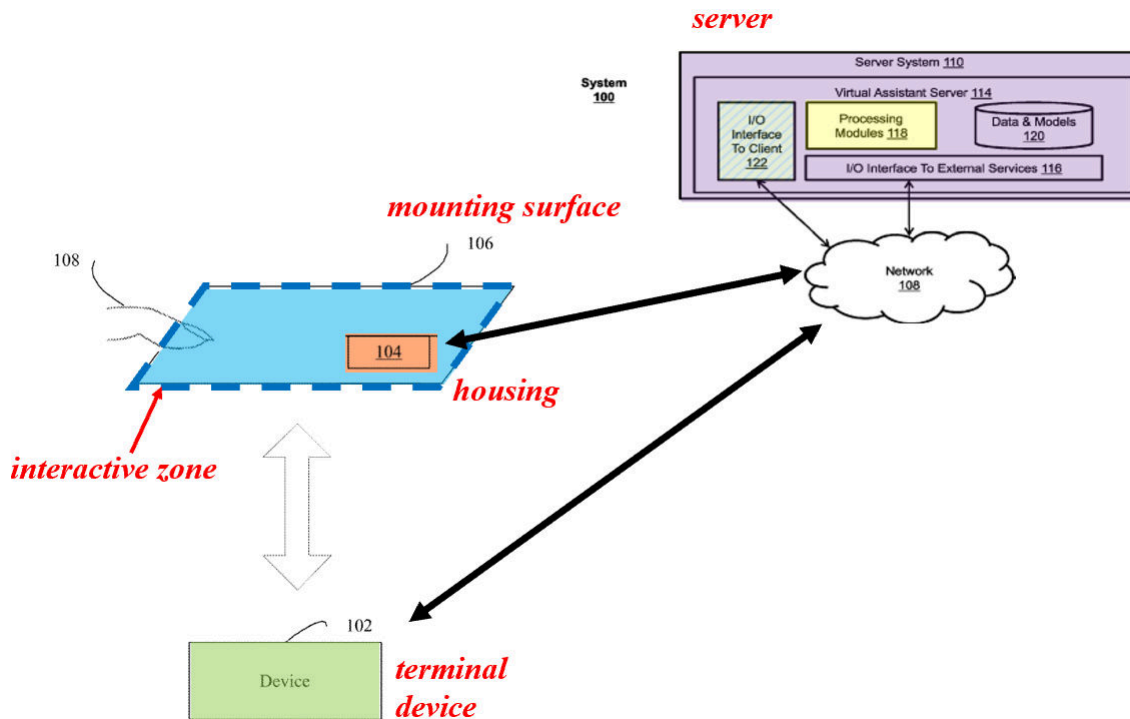
[1d-i]-[1d-iii]

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, ¶¶321-324, 157-162. 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, ¶¶325-326; 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, ¶¶325-326.

[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, ¶¶327-329; 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, ¶¶327-331. 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, ¶¶330-331.

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, ¶¶327-331. A POSITA would have further understood that the terminal device’s “processors and/or

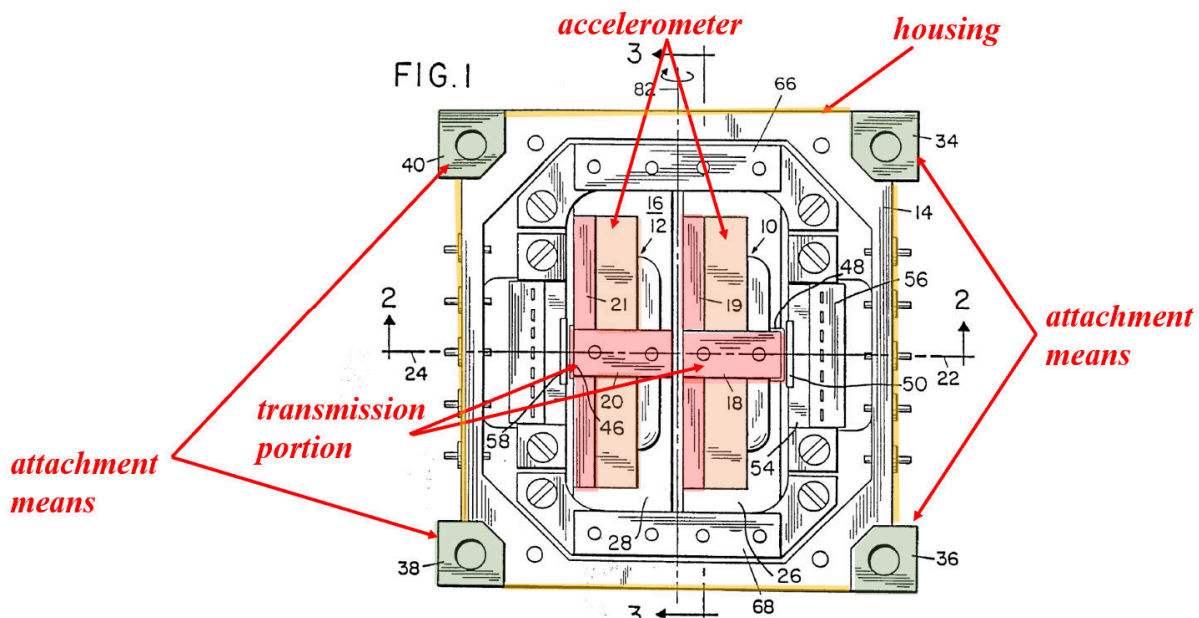
circuits” (receiving module) receives the control signal from the I/O transmitter of the server. APPLE-1004, [0093], [0023], [0050], [0033]; APPLE-1003, ¶¶327-331.

[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, ¶¶332-342.

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, ¶¶333-334. 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,

¶¶334-335.



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, ¶¶336-337. 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, ¶¶332-337.

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, ¶¶336-338. 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, ¶339. 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, ¶¶338-340. 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, ¶¶338-340.

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, ¶¶340-342; 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, ¶342.

[3a] wherein said transmission portion is comprised of a spring loaded portion so as to reduce damping of said contact interaction.

See claim 3 (Ground 1A). *Supra* §IV.A.4.[3a]; APPLE-1003, ¶¶343, 178-184.

b) Claim 6

[6pre] The control system, according to claim 1,

As described above, Murakoshi-Stewart-Sachs-Orr render obvious the

control system of claim 1. *See* §IV.C.3.[3pre] (discussion of claim 1 elements);
APPLE-1003, ¶¶344, 288-340.

[6a-i] further comprising: an additional sensor contained within said housing,

[6a-ii] said additional sensor forming an additional interactive zone defined by an additional range of said additional sensor,

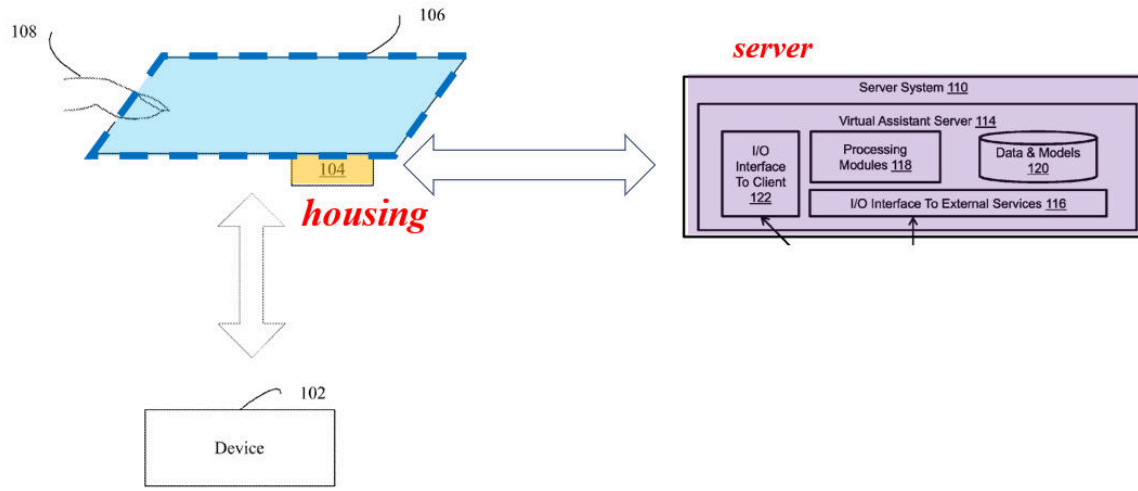
[6a-iii] said additional interactive zone being aligned with said mounting surface,

[6a-iv] said additional sensor being in a fixed position relative to said engagement means,

See claim 6 elements [6a-i]-[6a-iv] (Ground 1A). *Supra* §§IV.A.4.[6a-i]-
[6a-iv]; APPLE-1003, ¶¶345-346, 186-197.

[6a-v] said server being in communication with said additional sensor,

In Murakoshi-Stewart-Sachs-Orr, the server is in communication with both accelerometers 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, ¶¶347-349.



APPLE-1004, Fig. 1 (annotated; modified to include the server system of APPLE-1005, Fig. 1)

Murakoshi-Stewart-Sachs-Orr's additional accelerometer is in communication with the server via the I/O interface. APPLE-1004, [0032], [0018], [0025]; APPLE-1005, [0028], [0051]-[0052]; APPLE-1003, ¶348. Murakoshi describes that signals received from the one or more sensors are processed, which, in Murakoshi-Stewart-Sachs-Orr, occurs at the processing module of the server. APPLE-1004, [0032], [0025]-[0027], [0018], [0089], Fig. 2; APPLE-1005, [0028], [0056], [0081], [0091]-[0092], Fig. 1; APPLE-1003, ¶¶348-349. Accordingly, the server of Murakoshi-Stewart-Sachs-Orr is in communication with both accelerometers. APPLE-1003, ¶¶347-349.

[6b] wherein said contact interaction with said mounting surface within said additional interactive zone is detected by said additional sensor as additional data signals,

[6c] wherein said processing module determines said data pattern corresponding to said data signals of said sensor and said additional data signals of said additional sensor.

See claim 6 elements [6a-b]-[6c] (Ground 1B). *Supra* §IV.B.3.[6b]-[6c]; APPLE-1003, ¶¶350-351, 250-253, 201-203.

c) Claim 7

[7pre] The control system, according to claim 6,

As described above, Murakoshi-Stewart-Sachs-Orr renders obvious the control system of claim 1. See §IV.C.3.[3pre] (discussion of claim 1 elements); APPLE-1003, ¶¶254, 288-340.

[7a] wherein said interactive zone of said sensor overlaps with said additional interactive zone of said additional sensor.

See claim 7 (Ground 1A). *Supra* §§VI.A.4.[7]; APPLE-1003, ¶¶353, 205-206.

d) Claim 12

[12pre] The method of controlling the terminal device, according to claim 10,

Claim 12 is a method claim depending from independent claim 10.

Although claim 10 is written as a method claim, the limitations [10pre]-[10k-i] of claim 10 correspond substantially to the limitations of claim 1. Accordingly, under Apple's constructions of the relevant elements of claim 1, Murakoshi-

Stewart-Sachs-Orr render obvious the method of controlling the terminal device of claim 10 for at least the following reasons (with reference to the explanation of why the control system of claim 1 is rendered obvious by the combination).

Supra §IV.C.3.[1pre]-[1e]; APPLE-1003, ¶¶354-358, 288-340.

[10pre]-[10k-i]

See [1pre]-[1e] (Ground 1C). *Supra* §IV.C.3.[1pre]-[1e]; APPLE-1003, ¶¶355, 288-340.

[10k-ii]-[10l]

See [10k-ii]-[10l] (Ground 1A). *Supra* §IV.A.4.[10k-ii]-[10l]; APPLE-1003, ¶¶356-358, 212-215.

[12a] wherein said housing is further comprised of an additional sensor, said additional sensor being connected to said server,

Murakoshi-Stewart-Sachs-Orr renders element [12a] obvious for the same reasons discussed above in elements [6a-i] and [6a-v] (Ground 1C). *Supra* §IV.C.3.[6a-i], [6a-v]; APPLE-1003, ¶¶359, 345-349, 186-189.

[12b] wherein the step of detecting said contact interaction as data signals with said sensor further comprises detecting said contact interaction as additional data signals with said additional sensor;

Murakoshi-Stewart-Sachs-Orr renders element [12b] obvious for the same reasons discussed above in [12b] (Ground 1A). *Supra* §IV.A.4.[12b]; APPLE-1003, ¶¶360, 217, 201.

[12c] wherein the step of receiving said data signals from said sensor with said routing module further comprises receiving said additional data signals from said additional sensor with said routing module, and

[12d] wherein the step of determining said data pattern further comprises determining said data pattern corresponding to said data signals and said additional data signals with said processing module.

In Murakoshi-Stewart-Sachs-Orr, the data signals from the sensor and additional sensor are received at the I/O interface (routing module) of the server, per Orr, and processed at the processing module of the server, per Orr, based on Sachs' teachings to identify data features in the data signals for matching to stored signals. *See supra* §§IV.C.3.[1c-ii]-[1c-iii], [1c-v]-[1c-vi], [6c]; APPLE-1004, [0013], [0018], [0023]-[0025], [0032]; APPLE-1005, [0028], [0051]-[0052], [0056], [0081], [0091]-[0092]; APPLE-1003, ¶¶361-362, 309-310, 312-315.

e) Claim 13

[13pre] The method of controlling the terminal device, according to claim 12,

As described above, Murakoshi-Stewart-Sachs-Orr render obvious the method of controlling the terminal device of claim 10. *See* §IV.C.3.[12pre] (discussion of claim 10 elements); APPLE-1003, ¶¶363, 354-358, 288-340.

[13a] 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.

See claim 13 (Ground 1A). *Supra* §IV.A.4.[13a]; APPLE-1003, ¶¶364-365, 222. Additionally, in Stewart-Murakoshi-Sachs-Orr, physically impacting the

mounting surface includes making a plurality of physical impacts, per Sachs.

Supra §IV.B.3.[13a]; APPLE-1007, [0112] (“three tap gestures”); APPLE-1003, ¶¶222.

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 still 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 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 IPR50095-0190IP2@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 13,181 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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