

Paper No. ____

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VALVE CORPORATION,
Petitioner,

v.

IMMERSION CORPORATION
Patent Owner.

Case No. IPR2024-00582
Patent No. 11,175,738

**PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.1 *et seq.***

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APPENDIX LISTING OF EXHIBITS

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1001	U.S. Patent No. 11,175,738
1002	Prosecution History of U.S. Patent No. 11,175,738
1003	Prosecution History of European Counterpart to U.S. Patent No. 11,175,738
1004	Declaration of Dr. Gregory Welch (“Welch”)
1005	CV of Dr. Gregory Welch
1006	U.S. Patent Application Publication 2012/0249474A1 (“Pratt”)
1007	U.S. Provisional Patent Application No. 61/470,764 <i>(incorporated by reference in Pratt)</i>
1008	U.S. Patent No. 8,531,319 (“Ku”)
1009	U.S. Patent Application Publication 2013/0147728 (“Lee”)
1010	U.S. Patent Application Publication 2015/0061703 (“Jiang”)
1011	U.S. Patent Application Publication 2014/0139329 (“Ramstein”) <i>(incorporated by reference in Jiang)</i>
1012	U.S. Patent No. US 8,970,513 (“Kwon”)
1013	Exhibit G to Immersion’s Preliminary Infringement Contentions
1014	EP 2141580A2 (Ku’s European Counterpart)
1015	U.S. Patent Application Publication 2010/0004033 (“Choe”)
1016	U.S. Patent Application Publication 2008/0024459 (“Poupyrev”)
1017	U.S. Patent Application Publication 2018/0356891 (“Murakami”)
1018	U.S. Patent Application Publication 2011/0007021 (“Bernstein”)
1019	U.S. Patent No. 9,069,417 (“Rimon”)
1020	U.S. Patent Application Publication 2005/0134561 (“Tierling”)
1021	U.S. Patent Application Publication 2017/0300166 (“Rosenberg ’166”)
1022	U.S. Patent Application Publication 2017/0285848 (“Rosenberg ’848”)

Exhibit	Description
1023	U.S. Patent Application Publication 2009/0106655 (“Grant”)
1024	U.S. Patent Application Publication 2011/0102162 (“Gregorio”)
1025	U.S. Patent No. 7,902,474 (“Mittleman”)
1026	New Oxford American Dictionary, Third Edition (2010), definition of “pressure”
1027	American Heritage Dictionary of the English Language, Fifth Edition (2011), definition of “pressure”
1028	U.S. Patent Application Publication No. 2012/0143182 (“Ullrich”)
1029	McGraw-Hill Dictionary of Scientific and Technical Terms, Sixth Edition (2002), definition of “signal”
1030	Federal Court Management Statistics (September 2023)
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1033	<i>Immersion Corp. v. Valve Corp.</i> , 2:23-cv-00712, Dkt. No. 15 (Proof of Service) (May 18, 2023)

I. MANDATORY NOTICES

A. Real Party-In-Interest – § 42.8(b)(1)

Petitioner Valve Corporation (“Valve”) is the real party-in-interest.

B. Related Matters – § 42.8(b)(2)

1. United States Patent & Trademark Office

U.S. Patent No. 11,175,738 (“the ’738 patent”) was filed on December 13, 2016 as Application No. 15/377,096.

2. United States Patent Trial and Appeal Board

Valve has requested *inter partes* review of five other patents asserted by patent owner Immersion Corporation (“Immersion”) against Valve in the district court litigation identified in §I.B.3 below. *Valve Corporation v. Immersion Corporation*, Case Nos. IPR2024-00477, IPR2024-00478, IPR2024-00508, IPR2024-00556, and IPR2024-00557.

3. District Court Matters

The ’738 patent is at issue in *Immersion Corp. v. Valve Corp.*, 2:23-cv-00712-TL (W.D. Wash.).

C. Counsel and Service Information – § 42.8(b)(3) and (b)(4)

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A power of attorney is submitted with this petition. Counsel for Petitioner consents to service of all documents via electronic mail.

Petitioner requests *inter partes* review of claims 1-6, 14-16, and 19 (“challenged claims”) of the ’738 patent.

II. INTRODUCTION

The ’738 patent concerns “systems and methods for proximity-based haptic feedback.” EX1001, 1:24-25. Haptic feedback—providing touch-based sensations—was known before the ’738 patent’s December 2016 filing date. Prior art described integrating such haptic feedback into touchscreen-based mobile devices—the same application the ’738 patent claims. Like the ’738 patent, these earlier references also described providing haptic feedback based on both (1) “proximity signals” from a sensor indicating that a user’s finger was close to, but not touching, the screen and (2) “touch” signals indicating the finger had touched the screen.

In distinguishing prior art during the ’738 patent’s prosecution, applicants stressed the independent claims’ requirement that the claimed “haptic output signal” be “based at least in part on...first ***and*** second sensor signals”¹—one reflecting a finger’s proximity to the screen and the other actual contact with the screen. As

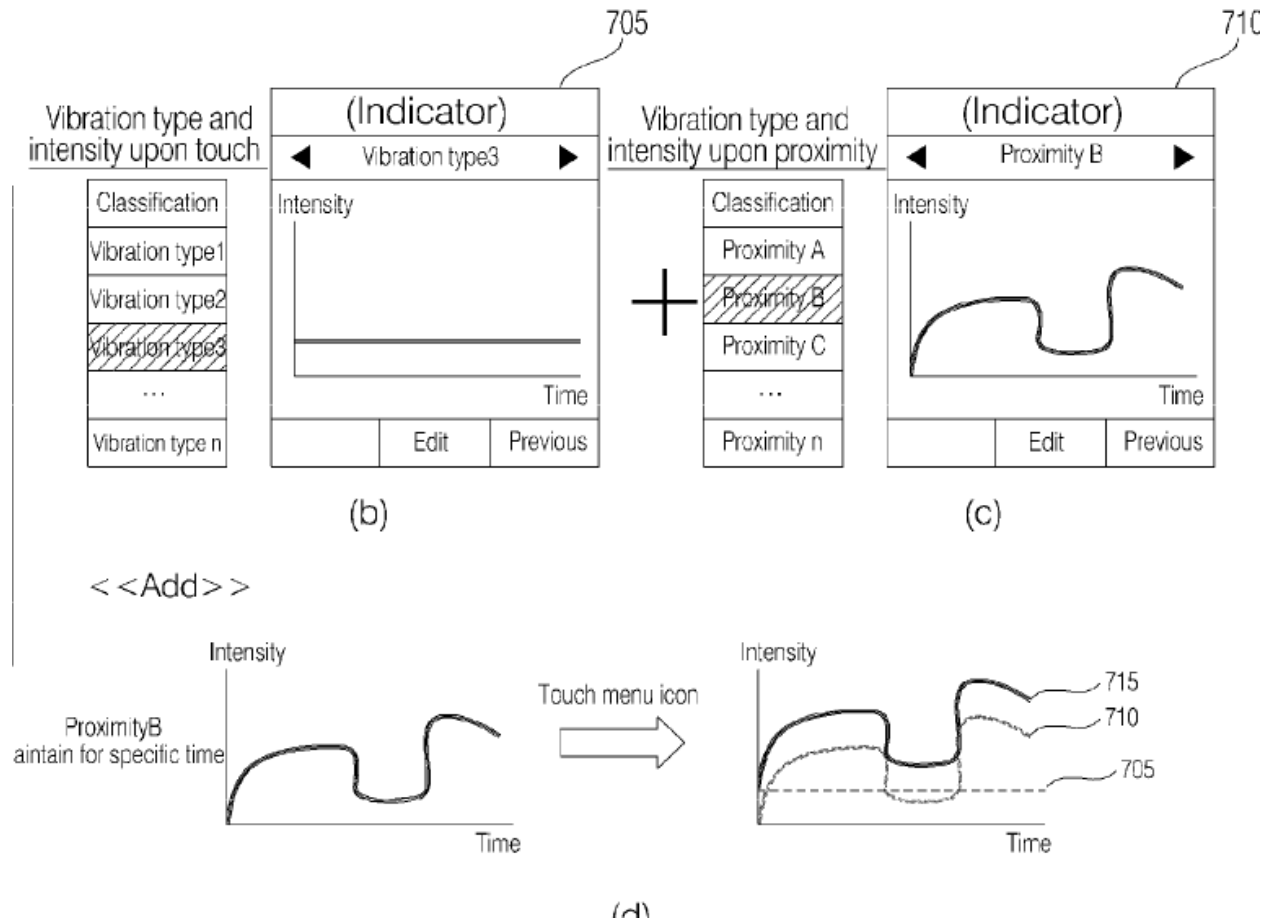
¹ ***Bold italic*** emphasis added unless otherwise indicated. *Plain italics* indicate claim language.

applicants argued and the Board agreed, the reference applied by the examiner disclosed *different* haptic effects at *different* times.

But other references not applied during prosecution disclose generating a *combined* haptic effect at the *same time* based on *both* proximity *and* touch signals.

For example, Pratt discloses a haptic “bubble effect” simulating “a clicking functionality.” EX1006, [0049]. The ’738 patent discloses a comparable “haptic effect meant to confirm ‘pushing’ on a virtual button.” EX1001, 11:29-40. Like the ’738 patent, Pratt describes these “click effects” as involving both “proximity-based operations” *and* determining that “the user’s finger has made contact.” EX1006, [0049]-[0051]. **Ground 1** demonstrates how Pratt anticipates or renders obvious all the challenged independent claims and most dependent claims.

Likewise, Ku discloses “[o]utput[ting] vibration in which vibration signals, each corresponding to the proximity signal and the touch signals, are *combined*.” EX1008, Figure 7 (S520). And Ku’s Figure 12 (below) illustrates outputting vibration 715 based on *both* proximity and touch signals if “after the proximity signal is maintained for a specific period of time, a menu icon” [i.e., on the display screen] “is touched.” EX1008, 16:22-27. A user only experiences haptic effect 715 if Ku detects both proximity and touch; 715 is a *combined* output effect adding together vibration associated with the proximity signal (710) and vibration associated with the touch signal (705).



Ground 2 demonstrates that Pratt in view of Ku renders obvious all challenged claims. POSAs would have had reason to use Pratt to implement the particular types of haptic feedback disclosed in Ku's Figures 7 and 12—obtaining Ku's benefits (such as distinguishing among different inputs) in Pratt's system.

Ground 3 separately demonstrates that Ku in view of POSAs' knowledge renders obvious all independent claims and all but one challenged dependent claim.

Ground 4 demonstrates that Ku in view of a secondary reference (Jiang) renders obvious the remaining challenged dependent claim, which recites an "integrated sensor" further comprising "the haptic output device" that outputs the

vibration. Jiang discloses such an integrated sensor incorporating a haptic output device.

III. CERTIFICATION OF STANDING

The '738 patent is available for IPR and Petitioner is not barred or estopped from requesting IPR of the challenged claims. 37 C.F.R. § 42.104(a).

IV. TABLE OF GROUNDS

Petitioners request cancellation of claims 1-6, 14-16, and 19 as follows:

Ground	Reference(s)	Claim(s)	Basis
1	Pratt	1-3, 5-6, 14-15, 19	102/103
2	Pratt/Ku	1-6, 14-16, 19	103
3	Ku	1-5, 14-16, 19	103
4	Ku/Jiang	1-6, 14-16, 19	103

The '738 patent was filed December 13, 2016, and is subject to the AIA. All above-identified references are post-AIA §102(a)(1) prior art not subject to any exception—all issued or published over one year before December 13, 2016:

Reference	Issued/Published
Pratt	10/4/12
Ku	9/10/13
Jiang	3/5/15

None of the above-identified references were cited during prosecution. While the published version of the application that became Ku was listed in a “Notice of References Cited” (EX1002, 62), the examiner never applied or discussed it.

V. THE '738 PATENT

A. Challenged Claims

Claims 1-6, 14-16, and 19 are reproduced in the Claim Listing (*infra* §X).

Independent claim 1 is reproduced below with added labels:

1[PRE]. A device comprising:

[1A] a proximity sensor capable of detecting a non-contact interaction with a touch-sensitive device and outputting a first sensor signal;

[1B] a touch sensor capable of detecting a touch with the touch-sensitive input device and outputting a second sensor signal;

[1C] a haptic output device configured to receive a haptic output signal and output a haptic effect in response to the haptic output signal; and

[1D] a processor configured to:

[1E] receive the first sensor signal and the second sensor signal;

[1F] generate a haptic output signal based at least in part on the first and second sensor signals; and

[1G] transmit the haptic output signal to the haptic output device.

Independent claim 15 recites a method with steps mirroring claim 1's functional elements. Independent claim 19 recites "[a] computer readable non-transitory medium encoded with program code" for performing such method.

The dependent claims recite minor additional details such as the proximity sensor being "integrated into the touch-sensitive device" (claim 2) or comprising

“one of a capacitive sensor or an optical sensor” (claim 3); an “integrated sensor” comprising both “the proximity sensor and the touch sensor” (claim 5) and also “the haptic output device” (claim 6); or the touch sensor being “capable of detecting a pressure and wherein the haptic output signal is based at least in part on the detected pressure” (claim 14). All these sensor implementations were known in the prior art.

B. Level of Ordinary Skill in the Art

A person of ordinary skill in the art (“POSA”) would have had a bachelor’s degree in electrical engineering, computer science, or a related field, plus at least two years of industry or graduate-level academic experience with human-computer interaction. EX1004 (“Welch”), ¶¶46-54. More education could substitute for experience, and vice versa. *Id.*

C. Prosecution History

The examiner initially rejected all claims over Choe (EX1015) while also citing secondary references for certain dependent claims. EX1002, 53-61.

Addressing solely the independent claims, applicants distinguished Choe’s haptic effect as “based only on proximity,” whereas the pending claims required “determining a haptic effect based on signals from” **both** “the proximity sensor and the touch sensor.” EX1002, 159.

On appeal, applicants reiterated that Choe concerned two “separated and distinct” haptic effects—one proximity-based and the other contact-based. *Id.*, 1036.

Applicants maintained that Choe outputted the events “sequentially”—not at “overlapping times.” *Id.*, 1075.

The Board agreed that Choe disclosed “two separate haptic effects” (one “based only on a proximity signal,” the other “based only a touch signal”), whereas the claims required “both touch and proximity signals be used to generate each haptic effect.” *Id.*, 1089-90. The Board further agreed that Choe described “outputting effects sequentially” rather than teaching that they could be “combined.” *Id.*, 1091.

The examiner subsequently allowed the claims. *Id.*, 1097.

D. EP Counterpart File History

On December 8, 2017, applicants filed a European counterpart application with independent claims identical to those in the U.S. application and almost identical to those in the issued U.S. patent. *See* EX1003, 33-35; Welch, ¶¶66-68. The European dependent claims likewise closely tracked those in the U.S. application. EX1003, 33-35; Welch, ¶69.

The April 25, 2018 European search opinion determined the independent claims lacked novelty over EP 2141580A2 (EX1014)—Ku’s European counterpart. EX1003, 95-96. The European opinion also concluded the dependent claims lacked “novelty and/or inventive step.” EX1003, 96.

In response, applicants did not dispute that originally-filed claim 1—including “generat[ing] a haptic output signal based at least in part on the first and second

sensor signals” (*id.*, 33) lacked novelty over Ku’s European counterpart (*id.*, 111-112). Applicants instead rewrote independent claim 1 to require an “integrated sensor” (as recited in certain dependent claims challenged herein) and argued that Ku’s European counterpart lacked such disclosure. *Id.*, 112-115. The EPO nevertheless maintained the rejection for lack of inventive step—even after applicants further narrowed the claims. *Id.*, 147-68. Applicants ultimately abandoned the application; no European counterpart to the ’738 patent issued.

VI. CLAIM INTERPRETATION

Claim terms are construed herein according to their ordinary meaning in light of the specification and prosecution history. 37 C.F.R. § 42.100(b). Because the Petition’s art plainly discloses each element of the challenged claims under any plausible construction, no outer boundary constructions are necessary. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1018 (Fed. Cir. 2017).

VII. UNPATENTABILITY GROUNDS

A. Ground 1: Pratt Anticipates and/or Renders Obvious Claims 1-3, 5-6, 11, 14-15, and 19

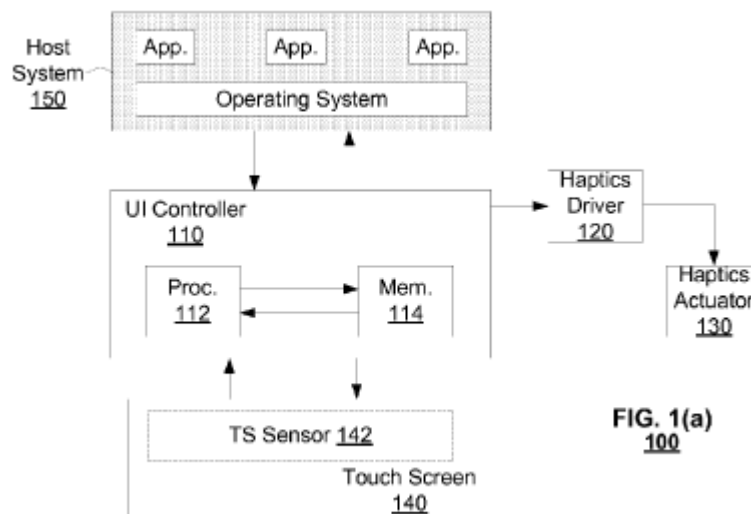
1. Pratt (EX1006)²

Pratt describes generating haptic effects in mobile electronic devices “based on proximity, touch, and/or force detection.” [0002]. For example, Pratt describes

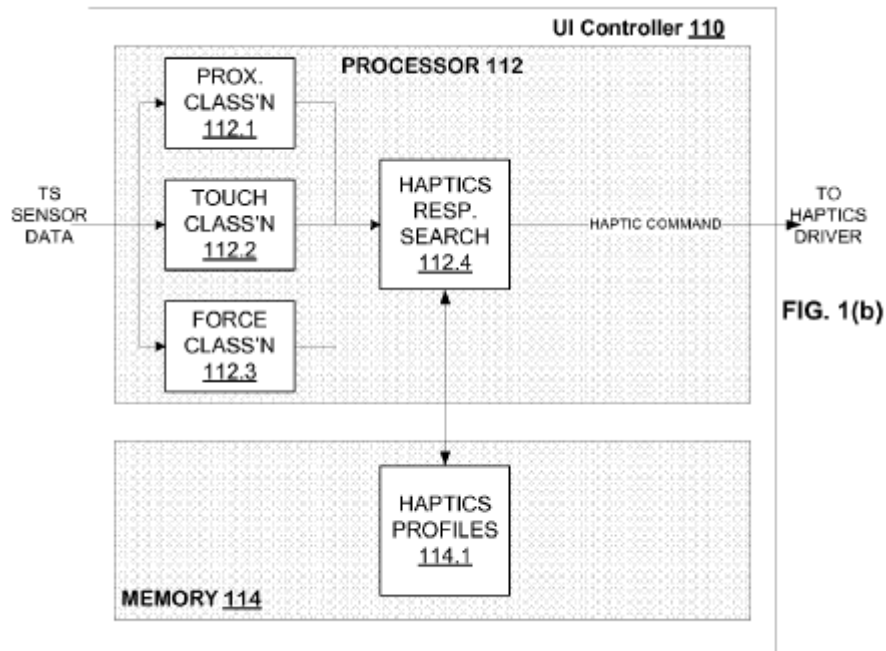
² Unless otherwise indicated, citations in §VII.A are to Pratt.

a “click” effect—also known as a “bubble” effect—to simulate the feel of pressing a button as the user’s finger touches the screen. [0049]-[0050].

Pratt generates a bubble effect only if Pratt’s touchscreen (TS) sensor 142 (e.g., a “capacitive sensor”)—outputs both a proximity signal (as the user’s finger approaches the screen) *and* a touch signal (once the finger makes contact). *Id.*; see also [0002]; [0021]-[0023]. Pratt’s “haptic-enabled display device” includes user interface controller 110 and “touch screen (TS) sensor 142.” TS sensor 142 sends “TS sensor results” to processor 112 within controller 110. This allows processor 112 to “calculate proximity, touch, and/or force interaction events.” [0015]-[0016].



Processor 112 incorporates “haptic response search module 112.4,” which “may receive proximity, touch, and/or force events as calculated by modules 112.1-112.3, and may generate a haptic command based on” that data. [0024].



As detailed below, Pratt’s bubble effect (analogous to the ’738 patent’s description of “a haptic effect meant to confirm ‘pushing’ on a virtual button,” EX1001, 11:37-40) and a separate embodiment Pratt also discloses each use both proximity and touch signals to generate a single haptic effect, which Pratt outputs based on the “haptic command” sent from Pratt’s processor. Welch, ¶¶82-84. Each of these two embodiments separately anticipates—or at minimum renders obvious—the challenged claims.

2. Claim 1

a. [1PRE]: “A device comprising:”

Pratt describes a “*device*” as claimed. Pratt discloses “a device including a haptic driver,” which may be “embodied as a consumer electronic device such as a cell phone.” [0014]-[0015]; Welch, ¶85.

- b. [1A]: “a proximity sensor capable of detecting a non-contact interaction with a touch-sensitive device and outputting a first sensor signal;”

Pratt’s device includes “a *proximity sensor*” that meets [1A]. Welch, ¶¶86-96.

Pratt’s “TS Sensor 142,” which is incorporated within touch screen 140, may “detect user interaction with the touch screen within a predetermined range above the touch screen.” [0014]-[0015]. It also detects touch interactions ([0022])—confirming the touchscreen is a “*touch-sensitive device*.” Welch, ¶87.

Pratt’s “proximity classification module 112.1” receives “proximity associated TS sensor data” from TS Sensor 142 and uses it to “calculate user proximity to [the] touch screen 140”—for example, the “location” of the “finger” “as it hovers over the touch screen.” [0021]. TS Sensor 142 therefore includes a “*proximity sensor capable of detecting a non-contact interaction with a touch sensitive device*,” as confirmed by Pratt’s disclosure that “the TS sensor results” allow UI controller 112 to “calculate *proximity*...user interaction events” ([0016]) and further that Pratt’s device can determine a user’s finger’s “coordinates based on the *proximity* sensor results” ([0043]). Welch, ¶88.

Pratt further discloses that TS Sensor 142 may be provided as a “grid of capacitive sensors” illustrated in Figure 2(a). [0022], [0029].

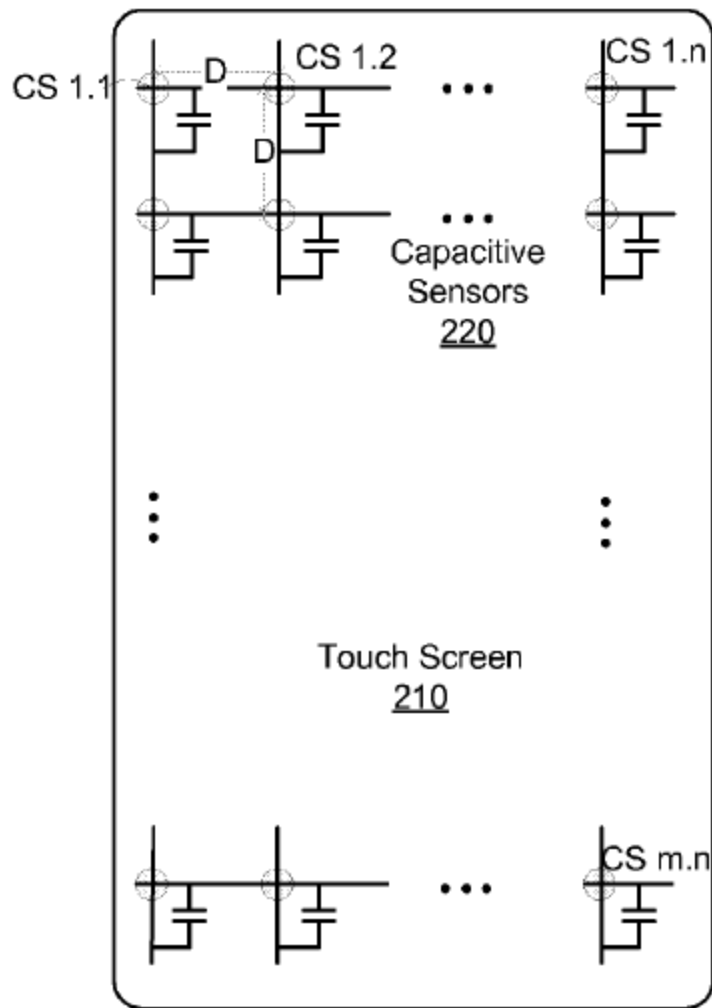
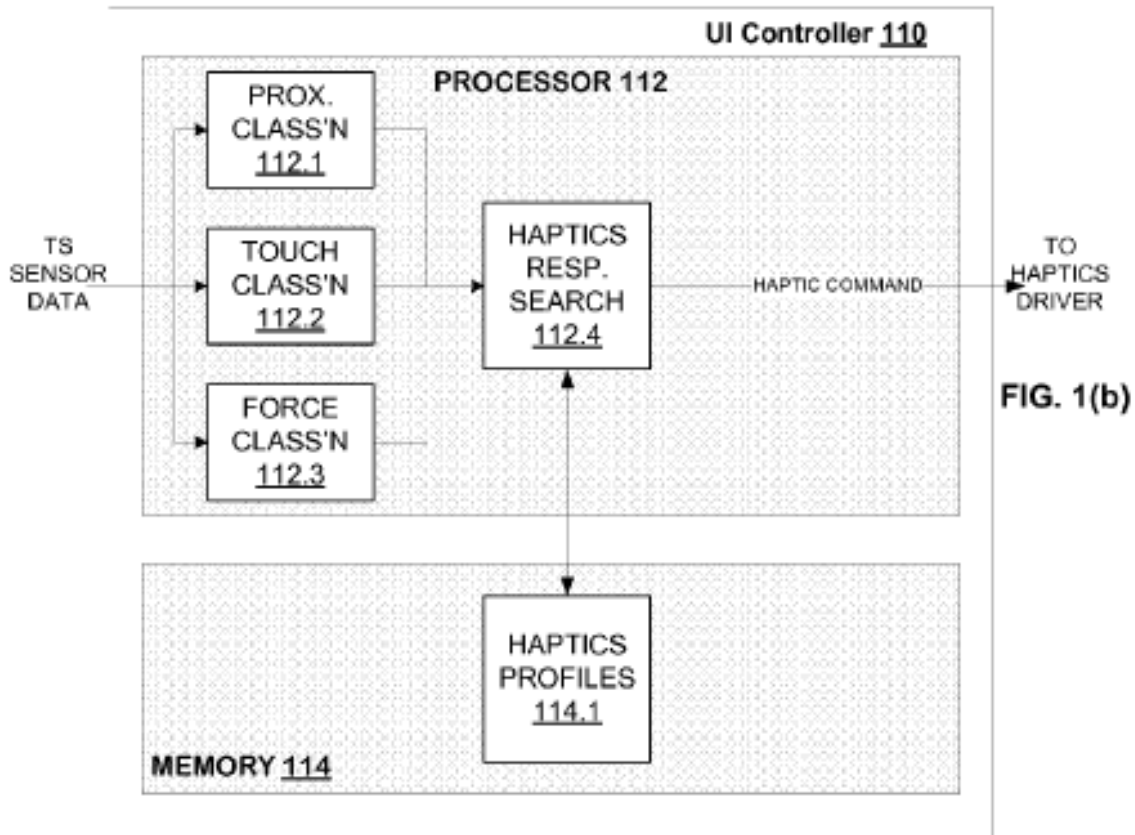


FIG. 2(a)

These “capacitive sensors 220 may detect proximity events.” [0032].

Further, Figure 1(b) illustrates how “TS sensor data” is received by processor 112—including by “proximity classification module 112.1.” [0020]-[0021].



This “TS sensor data” constitutes a “*first sensor signal*” output by the proximity sensor. Welch, ¶¶89-96. For example, the above-discussed capacitive sensors 220 include cross points, each of which can “generate a bit code result” reflecting “a change from normal (i.e., without user presence).” [0033]. Figure 2(c) illustrates how a finger hovering above capacitive sensor (CS) 1.1 causes CS 1.1 to “detect a larger presence in its capacitive field as compared to [the] neighboring CS 1.2”—yielding a higher code change. [0034]:

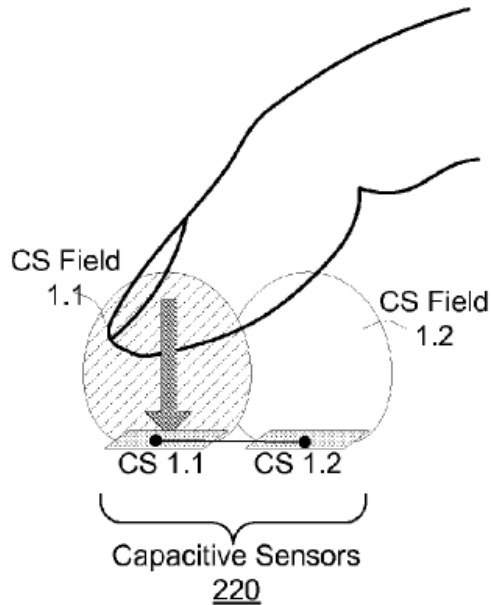


FIG. 2(c)

- c. [1B]: “a touch sensor capable of detecting a touch with the touch-sensitive input device and outputting a second sensor signal”**

Pratt’s device includes a “*touch sensor*” that meets [1B]. Welch, ¶¶97-108.

Pratt’s “touch screen (TS) sensor 142” includes a “*touch sensor capable of detecting a touch with the*” touch screen, as reflected in Pratt’s disclosure that “the TS sensor results” allow UI controller 112 to “calculate...touch...user interaction events.” [0014]-[0016]; *see also* [0022] (describing TS sensor 142 as including one or more “capacitive sensors” for “detecting touch events”). Such “TS sensor results” constitute a “*second sensor signal*” output by the touch sensor. Welch, ¶¶98-101. For example, capacitive sensors 220 (one embodiment of TS sensor 142, as §VII.2.b

explains) “may detect...touch events” [0032], with the “sensor results” enabling determination of “X,Y coordinates and the time of the touches” [0035].

Pratt’s disclosure—distinguishing between the first sensor signal (the proximity event, as §VII.A.2.b explains) and the second sensor signal (following the touch event, as §VII.A.2.c explains) mirrors the ’738 patent’s discussion. Welch, ¶¶102-107. The ’738 patent’s “sensor signal...may include data that reflects [] Z component of the finger's location” (i.e., “the distance of the finger from the surface of the touch-sensitive device”) when the finger is away “from the surface” (i.e., in proximity), and “may also include data that reflects [] the X and Y components of the finger's location” if “the finger [is] in contact with the surface.” EX1001, 2:54-67. Likewise, Pratt’s “sensor results” include a “bit code result” (i.e., data) that reflects “Z location” for “proximity detection,” [0034], and “X,Y coordinates and the time of the touches” for “touch detection.” [0035]; Welch, ¶107. The ’738 patent describes that a “processor receives the sensor signal and determines the position of the finger.” EX1001, 3:1-2. Pratt likewise uses the “classification module” in processor 112 to “calculate corresponding proximity, touch []event(s),” and to generate “X,Y,Z coordinates” during “proximity detection” and “X,Y coordinates” during “touch detection.” [0020], [0034], [0035]; Welch, ¶107.

Moreover, when disclosing a “touch sensor” integrated with the “proximity sensor” (as Pratt also discloses, *see infra* §VII.A.5), the ’738 patent does not

distinguish between the “first” and “second” signals beyond the claim requirement that the “first” signal derive from “a non-contact” interaction and the “second” signal from a “touch.” A signal received by the processor reflecting a touch—received by the processor separately from the signal reflecting a non-contact interaction—therefore constitutes a “second” signal even if in the same format (e.g., in the form of X,Y,Z coordinates) as the “first” signal reflecting the non-contact interaction. *Free Motion Fitness, Inc. v. Cybex Int’l, Inc.*, 423 F.3d 1343, 1348 (Fed. Cir. 2005) (“The use of the terms ‘first’ and ‘second’ is a common patent-law convention to distinguish between repeated instances of an element or limitation.”); *Taiwan Semiconductor Mfg. Co. v. DSS Tech. Management, Inc.*, IPR2014-01030, Paper 28, at 8-11 (Nov. 30, 2015) (“second” pattern could be duplicate of “first” pattern).

Pratt’s Figure 1(b) also illustrates how the “TS sensor data” is received by processor 112, which includes touch classification module 112.2. [0020].

Pratt’s TS sensor 142 is incorporated within touch screen 140, which constitutes a “*touch-sensitive input device*” for the same reasons explained in §VII.A.2.b why touch screen 140 constitutes a “touch-sensitive device.” POSAs would understand that [1B]’s “*the touch-sensitive input device*” is the “*touch-sensitive device*” referenced in [1A]. Welch, ¶¶99. Pratt’s touch screen 140 is an “*input device*” because it receives “user input thru the touch screen 140.” [0018]; Welch, ¶¶98-100.

d. [1C]: “a haptic output device configured to receive a haptic output signal and output a haptic effect in response to the haptic output signal; and”

Pratt’s device includes “*a haptic output device*” that meets [1C]. Welch, ¶¶109-118.

Figure 1(a) depicts “haptics actuator 130” coupled to “haptics driver 120” while Figure 1(b) illustrates “haptic response module 112.4” within processor 112 sending a “haptic command” to the “haptics driver.” [0015]-[0020], [0026]; Welch, ¶109. “Based on the haptic command,” the “haptic driver 120 may generate a corresponding drive signal” and “transmit the drive signal to the haptics actuator 130 causing it to vibrate according to the drive signal properties.” [0026].

Pratt discloses [1C] for two separate reasons, as “haptics actuator 130” constitutes “*a haptic output device*” both individually and in combination with “haptics driver 120.” Welch, ¶110.

First, Pratt’s actuator 130 constitutes *a haptic output device* as claimed because it receives the drive signal (i.e., “*a haptic output signal*”) and vibrates accordingly—outputting “*a haptic effect in response to the haptic output signal.*” Welch, ¶111.

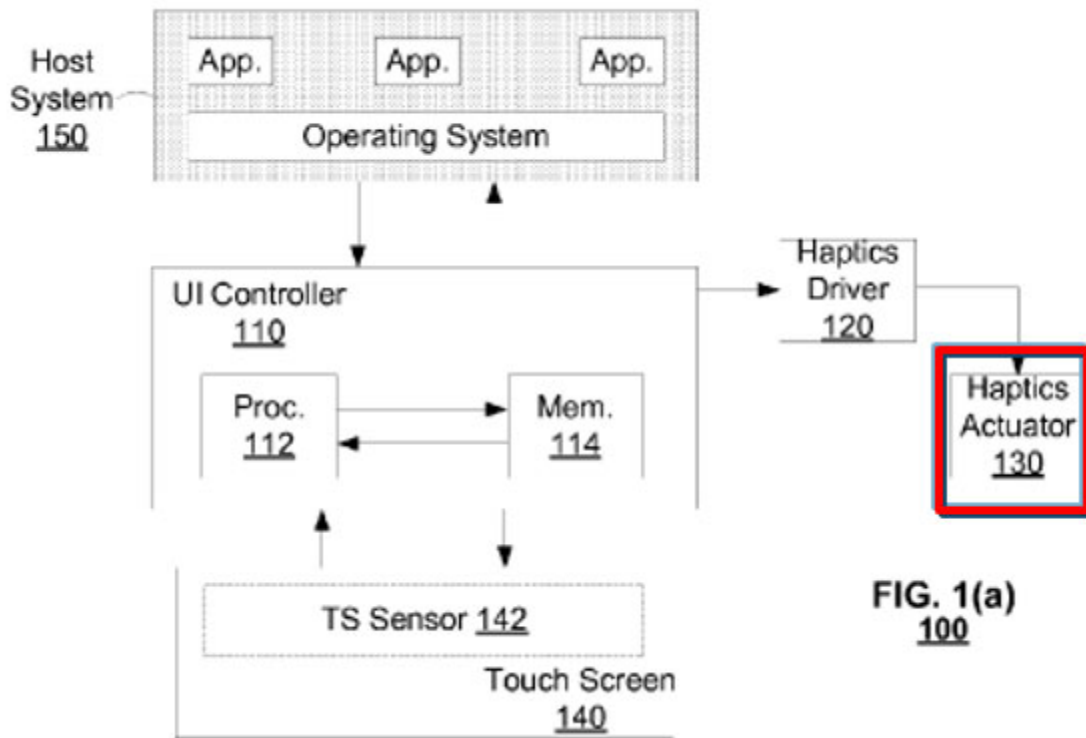
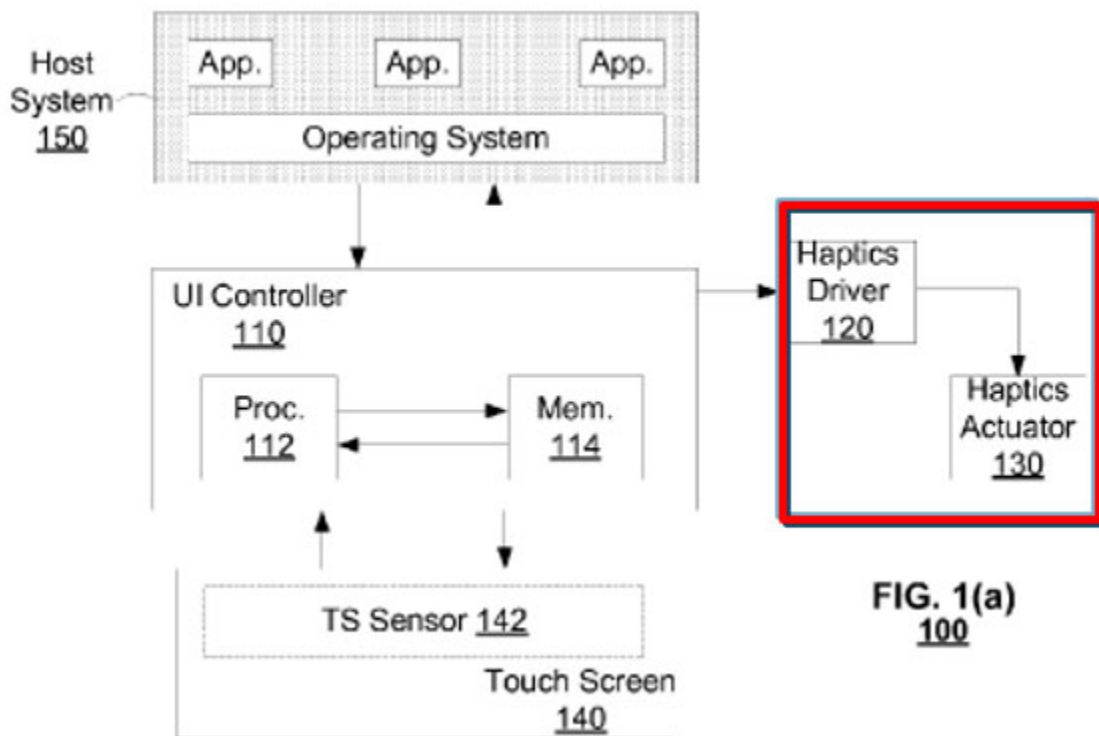


FIG. 1(a)
100

For example, “actuator 130 may include a...motor that vibrates to generate the desired haptic effect.” [0027]. The ’738 patent likewise states that a “haptic output device” may comprise an “actuator[] such as an electric motor.” EX1001, 5:45-46. Pratt’s actuator 130 receives a “drive signal” from haptics driver 120 “[b]ased on the haptic command” received by haptics driver 120 “from the UI controller,” which is “coupled to the driver.” [0025]. The drive signal that actuator 130 receives from driver 120 is a translated version of the haptic command received by the driver. Welch, ¶112. POSAs would understand that the driver simply translates the instruction (i.e., the haptic command) from digital form into an “analog” version (i.e., “corresponding drive signal,” [0025]) that actuator 130 understands (e.g., “a

current or voltage signal,” *id.*). Welch, ¶¶112-114. Nothing in the claim prohibits translation of the haptic output signal from the *processor* into a different format before it reaches the *haptic output device*. Welch, ¶114; *see also SiRF Tech., Inc. v. Int’l Trade Comm’n*, 601 F.3d 1319, 1330 (Fed. Cir. 2010) (interpreting claims to encompass “transmitting, whether direct or indirect”).

Alternatively, haptics driver 120 and haptics actuator 130 together constitute “a haptic output device” that receives “a haptic output signal” (i.e., Pratt’s “haptic command,” [0025]) from Pratt’s processor (i.e., Pratt’s processor 112 in UI controller 110, as §VII.A.2.e explains) and in response outputs “a haptic effect” such as vibration generated by actuator 130 ([0026]). Welch, ¶115.



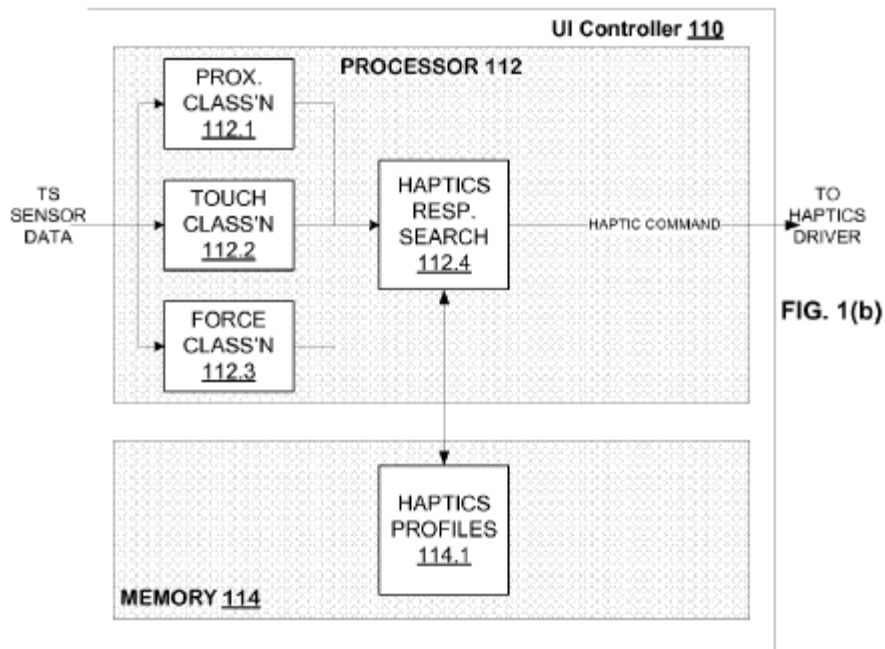
The ordinary meaning of “device” encompasses multiple hardware modules functioning together. *Home Depot U.S.A., Inc. v. Lynk Labs, Inc.*, IPR2021-01541, Paper 39 at 14 (Apr. 26, 2023); *Delphi Techs., LLC v. Microchip Tech. Inc.*, IPR2017-00861, Paper 63 at 14-16 (Aug. 28, 2018) . Nothing in the claim limits the haptic output device to any particular form—much less a single component. The combination of driver 120 and actuator 130 receives the “haptic command” and accordingly outputs a haptic effect, such as the actuator vibrating. [0026]; Welch, ¶¶116-118.

e. [1D]: “a processor configured to:”

Pratt’s device includes “*a processor configured to*” perform the remaining claim elements, detailed below. Welch, ¶119. Pratt includes “processor 112” within “UI controller 110.” [0017]; [0020].

f. [1E]: “receive the first sensor signal and the second sensor signal”

Pratt’s processor 112 is configured to “*receive the first sensor signal*” (from the proximity sensor) and the “*second sensor signal*” (from the touch sensor) as claimed. Welch, ¶120. Pratt’s Figure 1(b) illustrates the “TS sensor data” (including the proximity-related first sensor signal and the touch-related second sensor signal) received by processor 112 (including proximity classification module 112.1 and touch classification module 112.2):



See also [0020]-[0022]. The processor receives the proximity-related and touch-related signals at different times, e.g. during different “scan[s]” (occurring at a given “scanning frequency”)—confirming they are separate “first” and “second” signals. [0032], [0033]; Welch, ¶¶121-123; *Free Motion Fitness*, 423 F.3d at 1348.

g. [1F]: “generate a haptic output signal based at least in part on the first and second sensor signals; and”

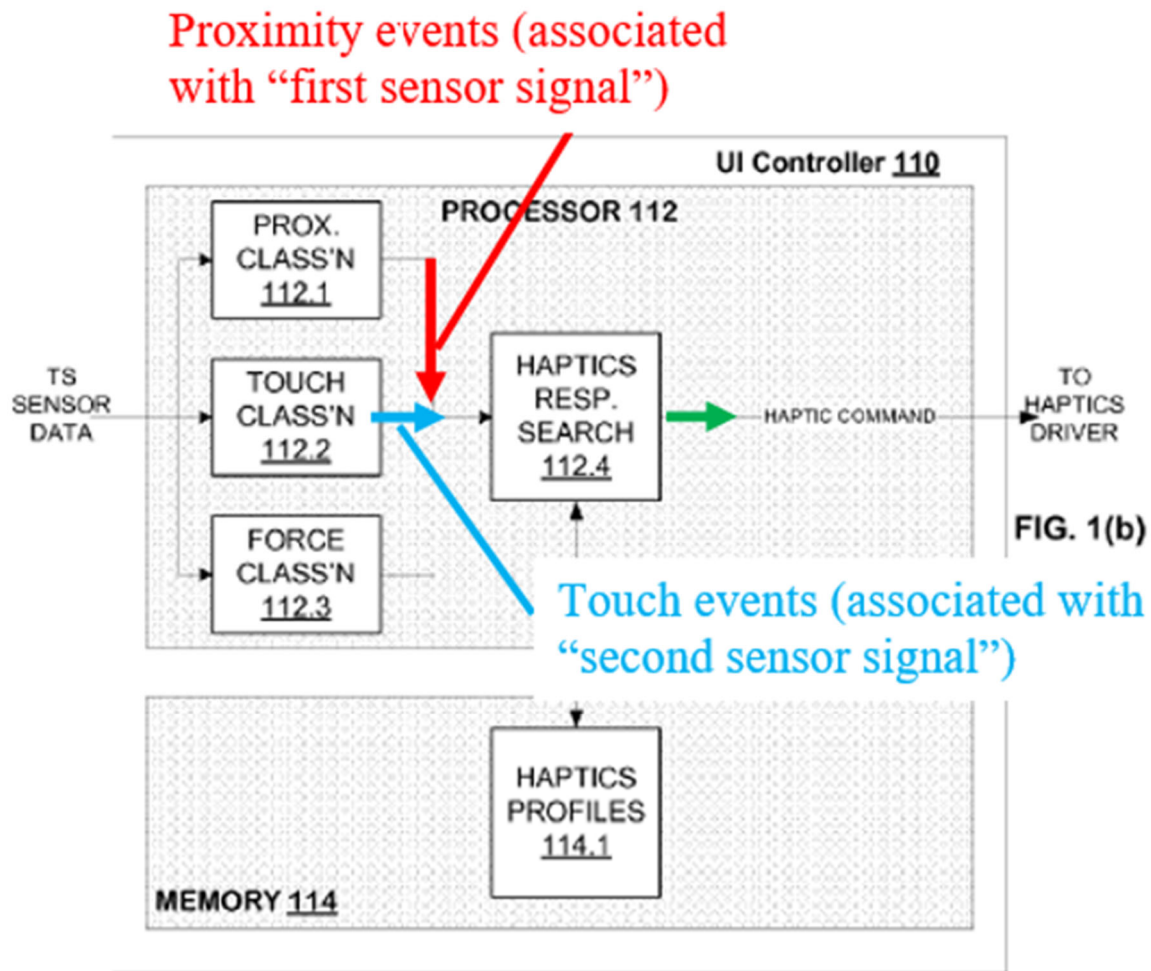
Pratt’s Figure 1(b) (above) illustrates the “haptics response search module 112.4” within processor 112 as being linked with proximity and touch classification modules 112.1 and 112.2 (which process the first and second sensor signals, respectively) and sending a “haptic command,” which as §VII.A.2.d explains meets the claimed “*haptic output signal*” and is translated by driver 120 into a drive signal that also meets the claimed “*haptic output signal*.” [1F]’s claimed “*haptic output*

signal” can be the same signal—whether in the same form or a corresponding translated form—referenced in [1C]. Welch, ¶124.

Pratt’s UI controller (via processor 112, which “control[s] the operations”) “may calculate proximity, touch, and/or force user interaction events,” and link “[h]aptic generation...to these proximity, touch, and/or force events.” [0016]-[0017]. Processor 112’s “module 112.4 may receive proximity, touch, and/or force events as calculated by the modules 112.1-112.3, and may generate a haptic command based on” comparing such data to haptics profile data 114.1, which is stored in memory 114 linked to processor 112. [0024]. Welch, ¶¶128-130.

In particular, Pratt’s search module “may match the calculated proximity, touch, and/or force event data to a stored haptic profile and may generate a haptic command associated with the matched haptic profile.” *Id*; *see also* [0042] (“[D]ifferent types of haptic events may be selected based in part on proximity, touch, and/or force events.”); Welch, ¶¶125-127, 131:

Pratt Figure 1(b)
(annotated)

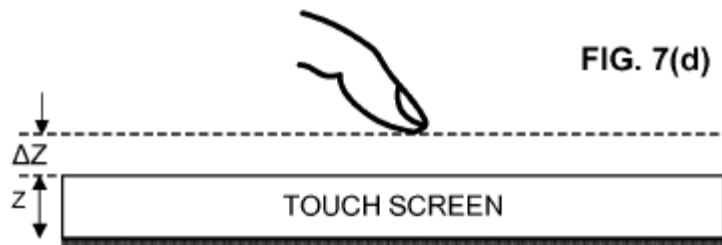
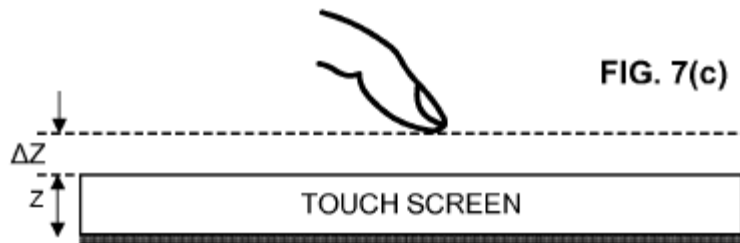
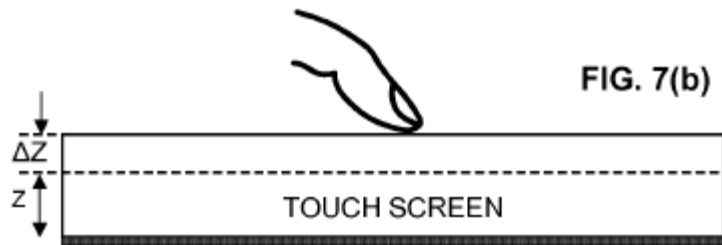
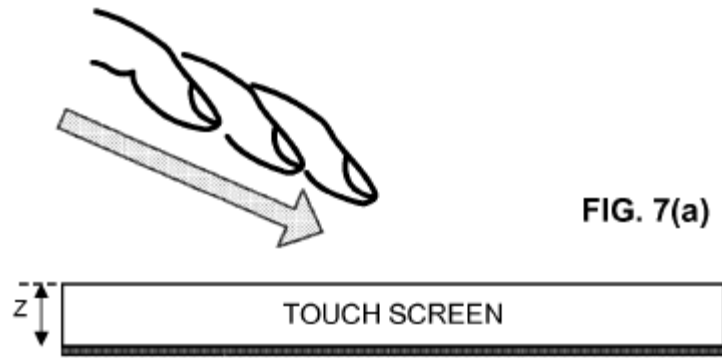


Pratt’s processor is therefore configured to determine a haptic command (i.e., “*the haptic output signal*”) based in part on a proximity event (the “*first*” sensor signal) and also in part on a touch event (the “*second*” signal). Welch, ¶¶132-134. Pratt indeed discloses at least two separate embodiments in which the “*haptic output signal*” reflects both proximity and touch-related inputs; or at minimum such a single haptic output signal would have been obvious in view of Pratt.

First, Pratt’s Figures 7(a)-7(d) illustrate a “mechanical compression effect (i.e., the ‘bubble’ effect)” simulating “a clicking functionality using haptic effects” and in particular effects that “may be pre-charged and driven before the user touch based on proximity detection.” [0049].³ The ’738 patent discloses a comparable “haptic effect meant to confirm ‘pushing’ on a virtual button.” EX1001, 11:38-40; *see also id.*, 5:23-25; Welch, ¶¶135-137.

To implement this bubble effect, Pratt first uses the “proximity sensor” (in TS Sensor 142, *see* §VII.A.2.b) to identify a “user’s finger approaching the touch screen,” at which point the “haptics driver may pre-charge a haptics actuator to cause the touch screen to deflect toward the user[’]s finger by a predetermined amount shown as ΔZ in FIGS. 7(a)-(d).” [0050]. Once the “touch sensor [also in TS Sensor 142, *see* §VII.A.2.c] determines the user’s finger has made contact, it may initiate the haptic effect,” such as simulating a “mechanical button click...by removing the pre-charge effect and inducing the touch screen to return to its default level (shown as ‘Z’).” [0050]. Welch, ¶¶138-141.

³ While [0049] references Figures “4(a)-4(d),” POSAs would recognize this as a typographical error. Welch, ¶135; *see also* [0013].



Generating this effect requires both (1) a signal generated by the proximity sensor (a “*first*” sensor signal per [1A], identified by processor 112’s proximity classification module 112.1) and (2) a signal generated by the touch sensor (a

“*second*” sensor signal per [1B], identified by touch classification module 112.2). Welch, ¶142. Pratt’s haptic response search module 112.4 ([0024]) thus generates a haptic command for this “bubble” effect at a particular time if—and only if—it has received **both** the proximity-related and touch-related signals. Welch, ¶¶143-144. While the “haptic effect” is not actually “initiat[ed]” until “the touch sensor determines that the user’s finger has made **contact**,” Pratt describes this as an example of “**proximity**-based deflection operations”—confirming that Pratt’s processor is configured to generate a haptic output based on **both** proximity and contact-based signals, meeting [1F]. [0050]-[0051]; Welch, ¶145. Figures 7(a)-7(d) indeed “illustrate **a** bubble effect generation operation” relying on both signals. [0049]; Welch, ¶145. Figures 7(a)-7(d) and the accompanying disclosures therefore meet [1F]. Pratt’s processor only generates a haptic command directing a bubble effect at a particular point in time if Pratt’s processor has received both first (proximity-related) and second (contact-related) signals. Welch, ¶147. This approach ensures a prompt response without “prolonged latency.” [0004]; Welch, ¶146. It also ensures the appropriate amount of deflection and thus a more accurate effect. Welch, ¶146.

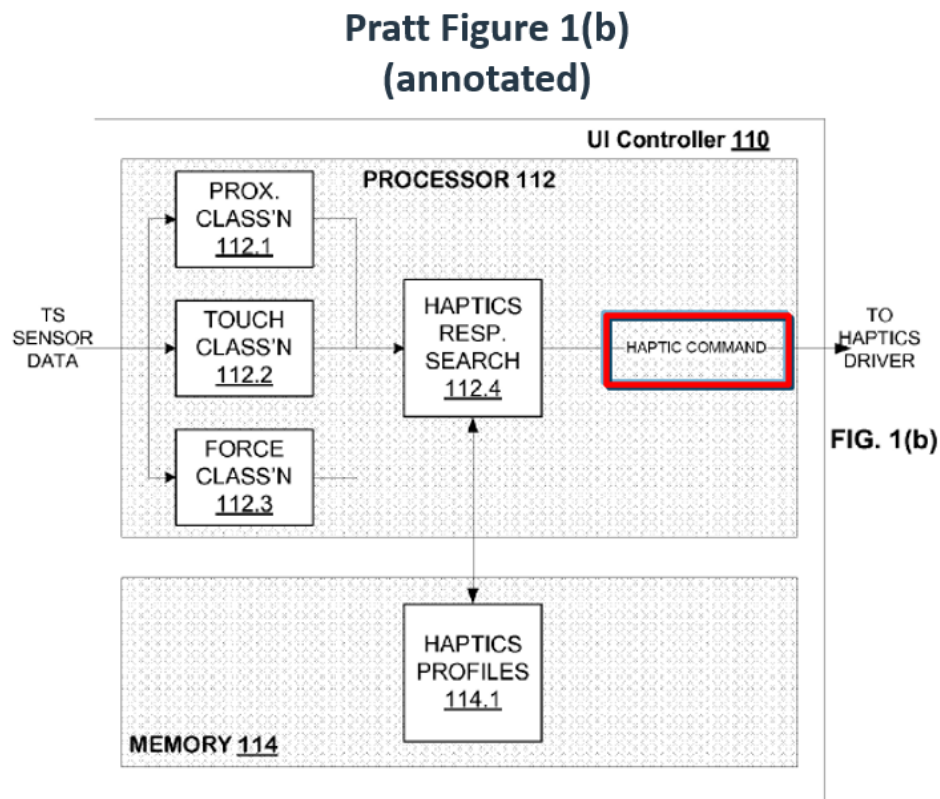
Second, and independent of Figures 7(a)-7(d), Pratt describes how “haptic effect types may be selected based on the rate of approach of the user’s finger as it moves toward a touch screen,” with one effect following a “fast” approach and a

different effect following a “slow” approach. [0041]. The approach rate is determined based on signals from the proximity sensor. [0034]; Welch, ¶¶148-149. However, POSAs would understand that paragraph 41 can be implemented such that the actual haptic effect is only generated after the device “detect[s] the finger making contact with the touch surface.” [0039]. In such implementations, the haptic output signal is based on signals from both the proximity *and* touch sensors—the proximity sensor enabling detection of the rate of approach at “time t1” and the touch sensor enabling detection of the location of the actual touch at “time t2.” [0039]; Welch, ¶149. POSAs would understand from these disclosures that if the proximity signal reflects a fast rate of approach at time t1, and the user’s finger then makes contact with the touch surface at time t2, Pratt’s processor sends a haptic output command calling for one particular haptic effect. If the proximity signal reflects a slower rate of approach at time t1, and the user’s finger then makes contact with the touch surface, Pratt’s processor sends a haptic output command calling for a different haptic effect. By contrast, if the user’s finger approached but then changed direction and did not contact the screen, Pratt’s processor would not send a haptic output command at all (despite having pre-charged the actuator while the finger was approaching as described in paragraph 39 to prepare for the anticipated touch). Welch, ¶149.

In any event, it would have been obvious to implement paragraph 41 this way—generating different haptic output signals to distinguish between touches based on quick approach rates versus touches based on slower approach rates (as described in paragraph 41) while also minimizing latency (as described in paragraph 39). Welch, ¶¶150-151; [0053] (“embodiments may be implemented...in combination”).

h. [1G]: “transmit the haptic output signal to the haptic output device.”

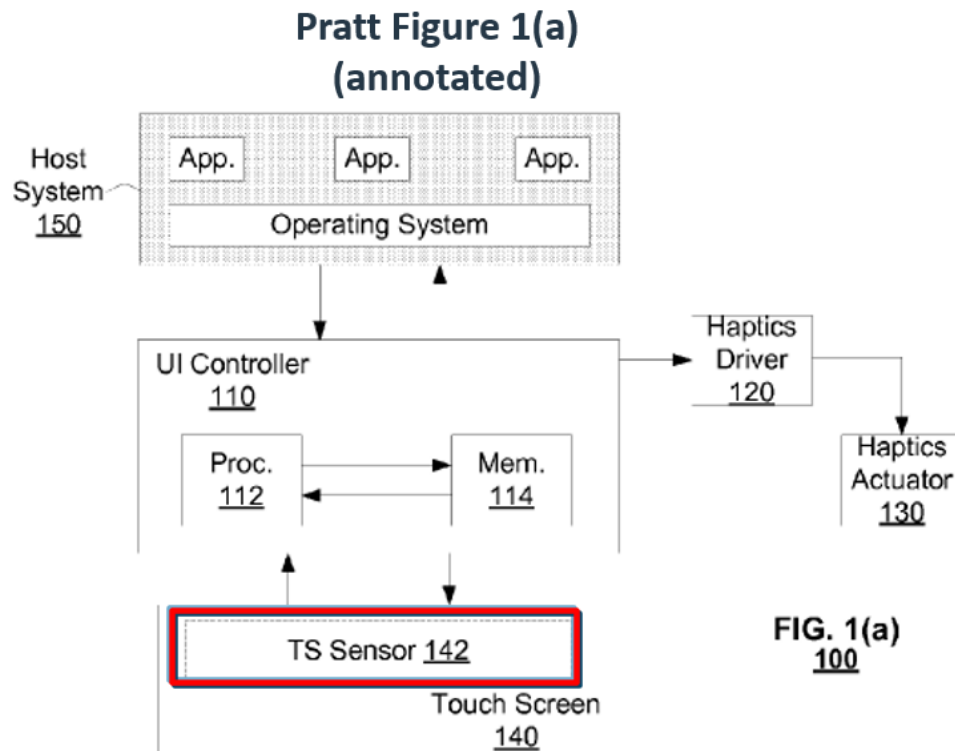
Figure 1(b) illustrates Pratt’s processor sending a “haptic command” (a claimed *haptic output signal*, based on the first and second sensor signals as discussed in §VII.A.2.g) to haptics driver 120.



Based on this “haptic command...haptic driver 120 may generate a corresponding drive signal” causing “haptics actuator 130...to vibrate according to the drive signal properties.” [0025]-[0026]. As §VII.A.2.d explains, “haptics actuator 130,” both individually and when considered together with “haptics driver 120,” constitutes a “*haptic output device*” receiving “*the haptic output signal*” transmitted from the processor. Welch, ¶¶152-153.

3. Claim 2: “wherein the proximity sensor is integrated into the touch-sensitive device”

As §VII.A.2.b explains, Pratt’s “proximity sensor” is in “TS Sensor 142,” which as Figure 1(a) shows is integrated into “touch screen 140”—thus “*integrated into the touch-sensitive device*” as claimed.



Welch, ¶¶154-155; *see also* [0015] (“touch screen 140 with a touch screen (TS) sensor 142”); [0019] (controller “may be coupled to the touch screen 140 and to the TS sensor 142 therein that measures different user interaction with the touch screen 140”); claim 1 (“touch screen includes a sensor”). Pratt discloses providing “the touch screen 140 and the TS sensor 142...as a capacitive touch screen and corresponding capacitive sensor.” [0021].

4. Claim 3: “the proximity sensor comprises one of a capacitive sensor or an optical sensor”

As §VII.A.2.a explains, Pratt’s “proximity sensor” is in “TS Sensor 142,” which Pratt discloses can include one or more “*capacitive sensor[s]*” as claimed. [0021]; Welch, ¶¶156-157.

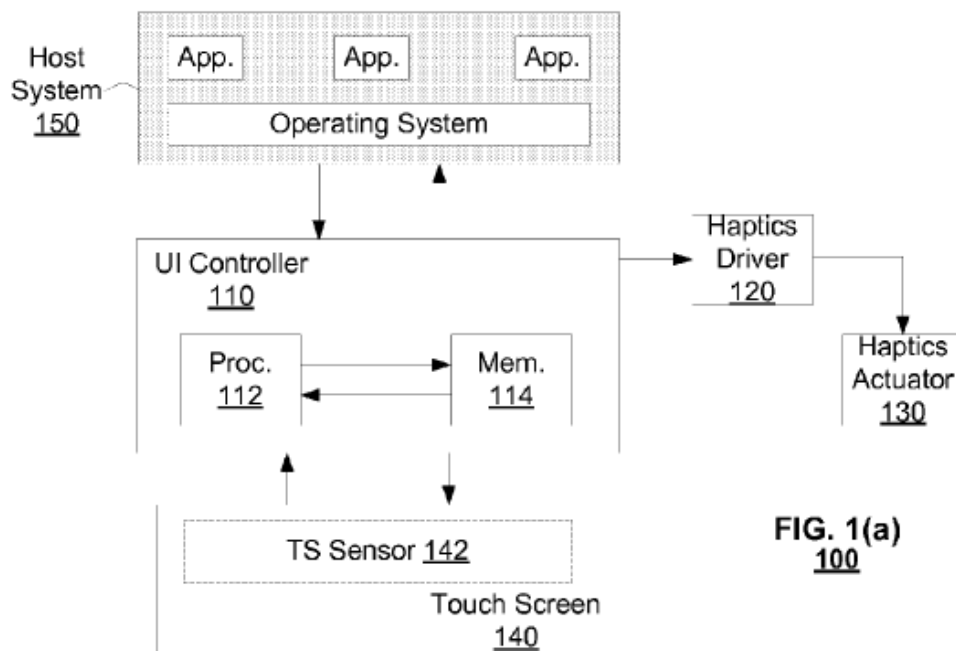
5. Claim 5: “an integrated sensor comprises the proximity sensor and the touch sensor”

As §§VII.A.2.a-b explain, Pratt’s “TS Sensor 142” detects both proximity and touch. Pratt therefore includes an “*integrated sensor compris[ing] the proximity sensor and the touch sensor*” as claimed. Welch, ¶158. This is further confirmed by Pratt’s disclosure that TS Sensor 142 can include one or more “capacitive sensors,” and that those capacitive sensors are capable of detecting both proximity (hence “*proximity sensor[s]*”) and touch (hence “*touch sensor[s]*”), as was known in the art. [0021]-[0022]; Welch, ¶159; EX1018, [0053], FIG. 9; EX1019, FIGs. 5A, 5B, 6A, 6B, 10:1-14, 13:38-55. Pratt’s disclosure parallels the ’738 patent, which

states without elaboration that the “sensor may comprise a dual-mode sensor” using “capacitance” to detect both “proximity” and “contact.” EX1001, 2:35-43; *see also id.*, 7:36-40. Welch, ¶160.

6. Claim 6: “the integrated sensor further comprises the haptic output device”

Pratt discloses a single device including “TS Sensor 142” (the “*integrated sensor*,” as §VII.A.5 explains) along with the haptics driver and the haptics actuator (with the actuator constituting the “*haptic output device*” both individually and together with the haptics driver, as §VII.A.2.d explains). Figure 1—a “diagram of a display device” (¶14)—includes TS Sensor 142, Haptics Driver 120, and Haptics Actuator 130. Welch, ¶161.

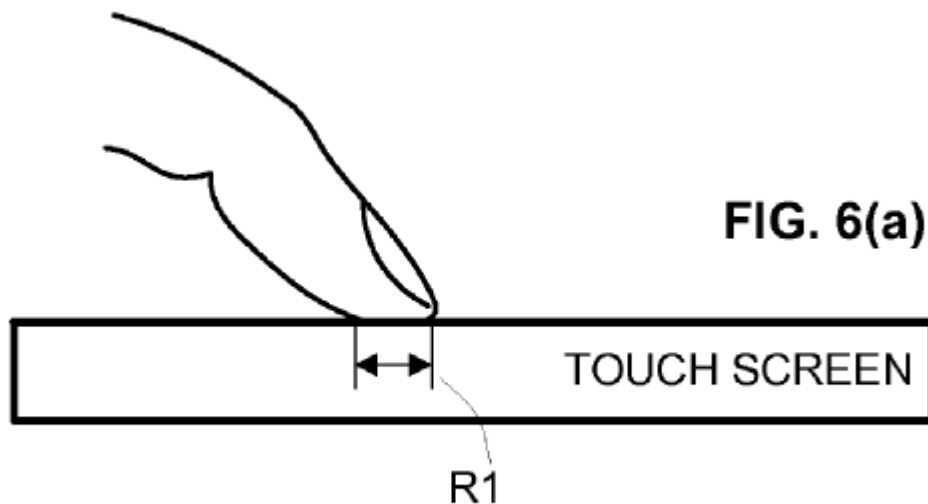


Pratt therefore satisfies claim 6 under Immersion’s co-pending litigation infringement contentions, which assume that “*integrated*” merely requires two components housing (e.g., within the same handheld controller). *See* EX1013, 21 (asserting that accused Valve Index Controllers satisfy claim 6 because they “include an HD LRA [linear resonant actuator] for Haptics”); *see also id.*, 19 (asserting that “each controller” includes sensors). Petitioner disagrees with this construction, which contradicts the ’738 patent’s definition of “*integrated*” discussed in §VII.D.5 below (explaining why Ku-Jiang renders claim 6 obvious under proper construction). But Immersion’s contention is nevertheless relevant. *E.g.*, *10X Genomics, Inc. v. Bio-Rad Labs., Inc.*, IPR2020-00086, Paper 8 at 19-20 (Apr. 27, 2020) (instituting review: “[W]e see no problem with Petitioner relying on statements by Immersion in the related district court action in which Patent Owner took a position on the scope of a challenged claim....”); *Western Digital Corp., v. SPEX Techs., Inc.*, IPR2018-00084, Paper 14 at 11 (April 25, 2018). Under Immersion’s logic, Pratt’s *integrated sensor* (i.e., TS Sensor 142) *further comprises the haptic output device* (i.e., Pratt’s haptics actuator 130—which Pratt teaches “may be embodied as...LRAs” ([0026])—either alone or together with Pratt’s haptics driver 120, *see* §VII.A.2.d) because TS Sensor 142 and the LRAs are contained within a single handheld housing (Welch, ¶¶162-163).

7. Claim 14

a. [14A] “the touch sensor is capable of detecting a pressure”

Pratt’s “TS Sensor 142” (the “*touch sensor*,” per §VII.A.2.c) is “*capable of detecting a pressure*” as claimed. Pressure encompasses force per unit area. EX1026; EX1027; Welch, ¶164. Pratt’s TS Sensor 142 is capable of detecting both, as confirmed by Pratt’s disclosure of a “force detection operation” ([0012]) that “detects force applied to a touch screen” and in particular relies on Pratt’s “touch sensor” to register the touch of a user’s finger “on the touch screen as an area of contact,” then also “derive a force at the point of contact from the calculated area” (e.g., “a circle having a radius R,” as shown in Figure 6(a)) ([0047]).



POSAs would understand from these disclosures that TS Sensor 142 detects a force over a (circular) contact area and therefore a pressure. Welch, ¶¶165-166. Pratt

likewise discloses using “the TS sensor result” to “calculate...force user interaction events.” [0016]. Processor 112’s “force classification module 112.3” indeed “calculate[s] an amount of force corresponding to a user touch on the touch screen 140.” [0023].

b. [14B] “the haptic output signal is based at least in part on the detected pressure”

Pratt discloses embodiments in which the above-discussed “*haptic output signal is based at least in part on the detected pressure*” as claimed. Welch, ¶167; [0016] (“[H]aptic generation may be dynamically changed and/or adjusted based on detected proximity, touch, *and/or force events.*”)

Pratt’s device generates a haptic effect corresponding to “amount of force”—“for example...an alert to the user that he/she is pressing too hard on the touch screen.” [0045]. It would have been obvious to incorporate this haptic-based warning into the embodiments discussed in §VII.A.2.g, to alert users when they are pressing the screen too hard. Welch, ¶168; [0053] (“embodiments may be implemented [] in combination”). Under this approach, Pratt’s processor would base Pratt’s haptic command (i.e., “*the haptic output signal*”) on proximity, touch, and force events combined—consistent with Pratt’s disclosure that haptic response search module 112.4 within processor 112 “may receive proximity, touch, and/or force events” and “match the calculated proximity, touch, and/or force event data to

a stored haptic profile and may generate a haptic command associated with the matched haptic profile.” [0024].

For example, in connection with Pratt’s “bubble effect” ([0049]-[0050]), it would have been obvious to simulate one type of “mechanical button click” if Pratt’s device detected a pressure below a certain threshold and a different type of click effect if Pratt’s device detected a pressure above the threshold (e.g., alerting the user they’re pushing too hard). Welch, ¶169.

Similarly, in connection with Pratt’s reliance on the speed of a finger’s approach to select the particular haptic effect upon contact with the screen ([0039], [0041]), it would have been obvious to vary the haptic effect depending on whether Pratt’s device detected a pressure above the threshold, to alert the user of a risk of screen damage. Welch, ¶¶170-171.

Separately, it would have been obvious to generate the bubble effect (as described in paragraphs 49-50) or other haptic effect (paragraphs 39-41) only if the detected pressure exceeded a given threshold—applying a well-known technique to distinguish between intentional versus inadvertent touches. *See* EX1016, [0087] (“pressure threshold...to avoid accidental actuation”); EX1017, [0035] (“predetermined pressure or greater” to “reduce the occurrence of erroneous input due to the user mistakenly touching the touch surface”). Welch, ¶172. Doing so

would have been routine since, as discussed above, Pratt’s touch sensor is capable of detecting pressure. *Id.*

8. Claim 15

Claim 15—reciting a method with elements mirroring those in apparatus claim 1—is anticipated by, or alternatively obvious over, Pratt based on the same disclosures discussed in §VII.A.2. Welch, ¶174. Pratt’s Figures 7(a)-7(d) illustrate a method satisfying all claimed steps via the “bubble effect generation operation.” Welch, ¶175. Paragraphs 39-41 separately satisfy all claimed steps. Welch, ¶176.

a. [15PRE]: “A method comprising”

Both of Pratt’s embodiments discussed in §VII.A.2.g involve a “*method*” as claimed. Welch, ¶¶177-179.

b. [15A]: “detecting, by a proximity sensor, a non-contact interaction with a touch-sensitive device”

Both of Pratt’s embodiments discussed in §VII.A.2.g involve “*detecting, by a proximity sensor, a non-contact interaction with a touch-sensitive device.*” Welch, ¶¶180-182.

Pratt’s Figure 7(a) illustrates using Pratt’s “proximity sensor” to identify the non-contact interaction of a “user’s finger approach[ing] the touch screen.” [0050]; Welch, ¶181. This method was practiced using Pratt’s device as detailed in §VII.A.2—including proximity sensor “TS Sensor 142.” Welch, ¶181.

The method described in Pratt’s paragraphs 39-41 likewise relies on TS Sensor 142 to generate data for determining the “rate of approach of the user’s finger as it moves toward a touch screen.” [0041]; Welch, ¶182.

c. [15B]: “detecting, by a touch sensor, a touch on the touch-sensitive device”

Both of Pratt’s above-identified embodiments involve “*detecting, by a touch sensor, a touch on the touch-sensitive device.*” Welch, ¶¶183-185.

Pratt’s Figure 7(b) illustrates using Pratt’s “touch sensor [to] determine[] that the user’s finger has made contact” with the screen. [0050]; Welch, ¶184. This method was practiced using Pratt’s device as detailed in §VII.A.2—including touch sensor “TS Sensor 142.” Welch, ¶184.

The method described in Pratt’s paragraphs 39-41 likewise relies on TS Sensor 142 “to detect the finger making contact with the touch surface.” [0039]; Welch, ¶185.

d. [15C]: “transmitting a first sensor signal associated with the non-contact interaction to a processor”

Both of Pratt’s above-discussed embodiments rely on Figure 1(b)’s design, in which “TS sensor data” is received by processor 112—including proximity classification module 112.1. [0020]; *see also* [0039]; [0050]; FIG. 7(a); Welch, ¶¶186-188. Pratt therefore teaches [15C] as claimed.

e. [15D]: “transmitting a second sensor signal associated with the touch to a processor”

Both of Pratt’s above-discussed embodiments rely on Figure 1(b)’s design, in which “TS sensor data” is received by touch classification module 112.2 within processor 112. [0020]; *see also* [0050]; FIG. 7(b); Welch, ¶¶190-192. Pratt therefore teaches [15D] as claimed. POSAs indeed would understand that [15D] encompasses transmitting the second sensor signal to the processor. Welch, ¶189.

f. [15E]: “receiving, by the processor, the first and second sensor signals”

Pratt’s determinations of a “non-contact interaction” (discussed in [15A] and [15C]) and “touch” ([15B] and [15D]) are made pursuant to Figure 1(b), which illustrates processor 112 receiving “TS sensor data.” Pratt therefore teaches [15E] as claimed. Welch, ¶193.

g. [15F]: “generating, by the processor, a haptic output signal based at least in part on the first and second sensor signals”

As §VII.A.2.g explains, Pratt discloses two different embodiments (paragraphs 49-50, and paragraph 39-41) in which processor 112 generates a haptic output signal based in part on the first and second sensor signals. Welch, ¶194. Pratt therefore teaches [15F] as claimed.

h. [15G]: “transmitting, by the processor, the haptic output signal to a haptic output device”

As Figure 1(a) reflects, both of the embodiments identified above in connection with [1F] and [15F] involve transmitting the haptic output signal from Pratt’s processor to Pratt’s “haptics driver 120” and ultimately Pratt’s “haptics actuator 130.” As §VII.A.2.d explains, actuator 130 constitutes a “*haptic output device*” to which the processor transmits a haptic output signal when considered individually and also when considered together with driver 120.

For example, the bubble haptic effect described in Pratt’s paragraphs 49-50 is generated by Pratt’s haptic output device (haptics driver 120 either alone or considered together with haptics actuator 130, as §VII.A.2.h explains) based on the haptic output signal sent by the “haptic response search module 112.4” within Pratt’s processor ([0024]). Welch, ¶195. Paragraph 50 references Pratt’s “haptics driver,” which receives the “haptic command” (i.e., *the haptic output signal*) from the processor. Welch, ¶195.

Pratt therefore teaches [15G] as claimed.

i. [15H]: “outputting, by the haptic output device, a haptic effect in response to the haptic output signal”

The haptic effects discussed in §VII.A.2.g are generated by Pratt’s haptic output device (haptics actuator 130 alone or together with driver 120, *see*

§VII.A.2.h) based on the haptic output signal sent by the processor per Figures 1(a)-1(b). Welch, ¶196. Pratt therefore teaches [15H] as claimed.

9. Claim 19

Claim 19 recites a “*computer-readable non-transitory medium encoded with executable program code*” for executing the steps of method claim 15 other than [15H].

Claim 19 is anticipated by, or alternatively obvious over, Pratt for the same reasons as claim 15. Pratt teaches that “embodiments may be implemented, for example, using a computer-readable medium or article which may store an instruction or set of instructions that, if executed by a machine, may cause the machine to perform a method.” [0055]. Pratt discloses many non-transitory examples of such media. [0055]. POSAs would have understood that these teachings apply to both of Pratt’s embodiments discussed in §VII.A.8. Welch, ¶¶197-199.

B. Ground 2: Pratt-Ku Renders Claims 1-6, 14-16, and 19 Obvious

1. Ku (EX1008)

Ku discloses “systems and methods” to “distinguish between different types of touch signals and proximity signals that are detected by a mobile terminal” (EX1008, 1:32-34), such as generating “a *combined* vibration signal corresponding to the proximity signal *and* the touch signal” if the system determines that both signals originate from the same on-screen location (*id.*, 1:61-2:5).

For example, Ku discloses a mobile terminal with a touch screen displaying multiple on-screen icons. Welch, ¶¶201-202.

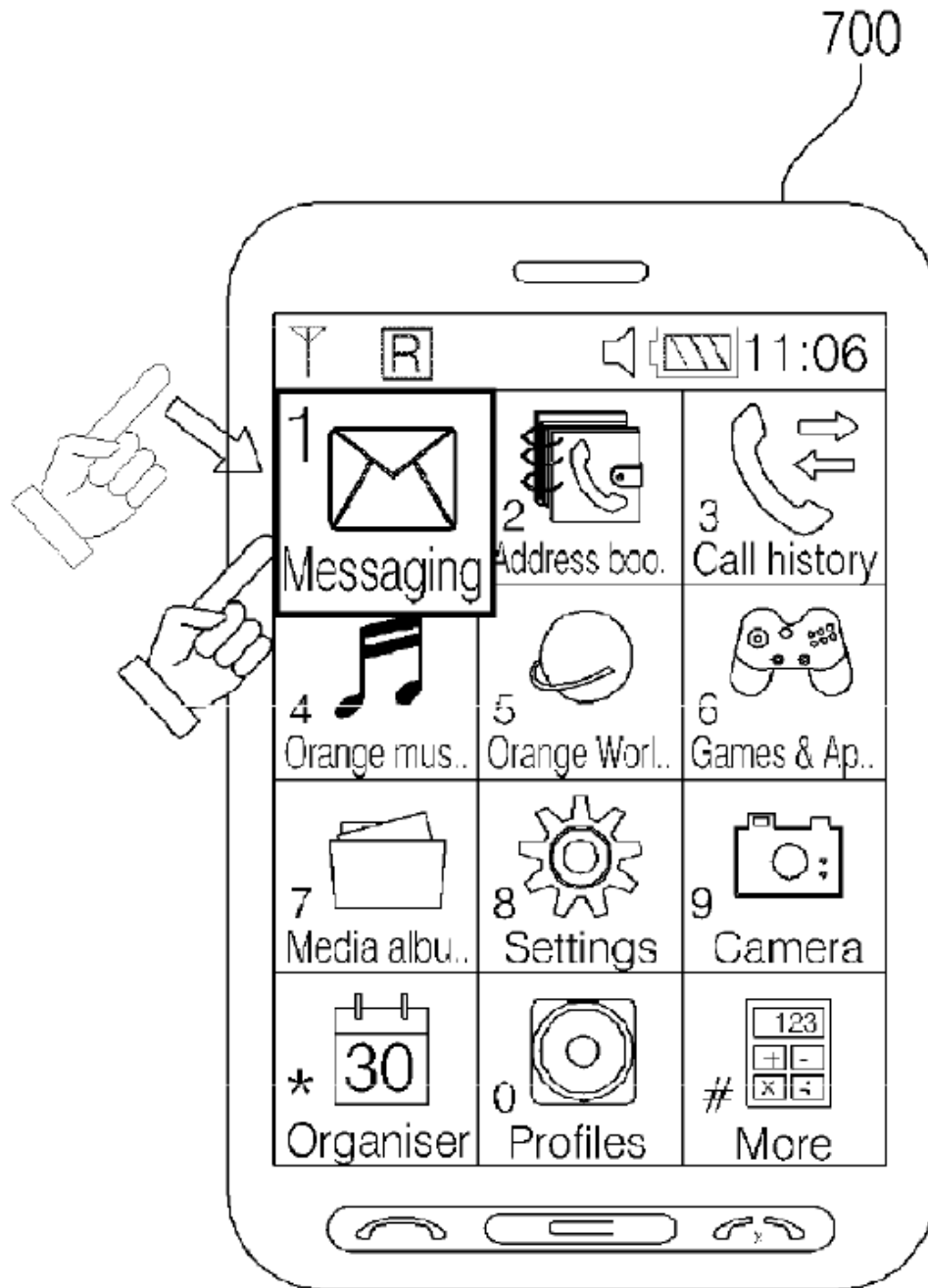
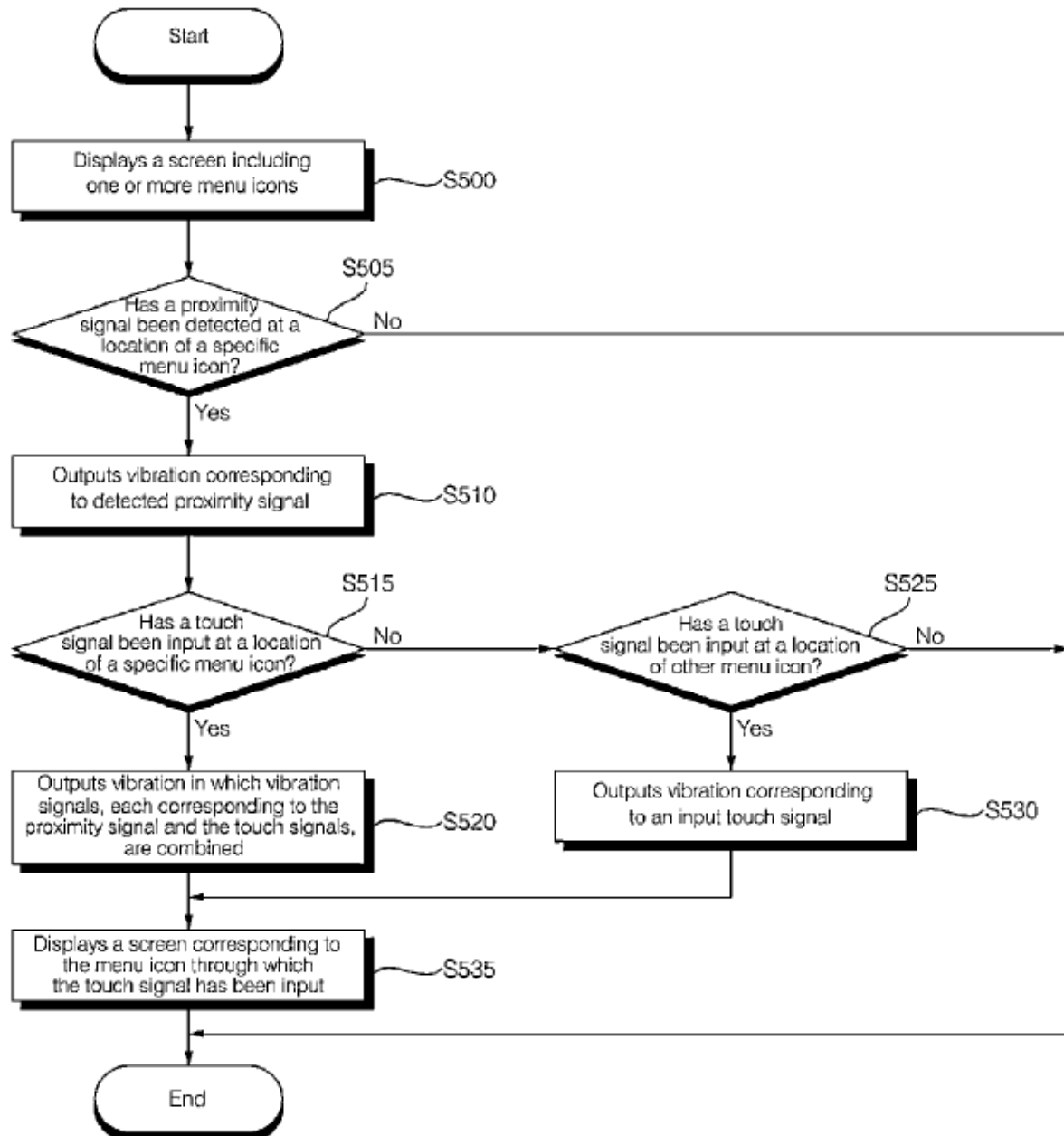
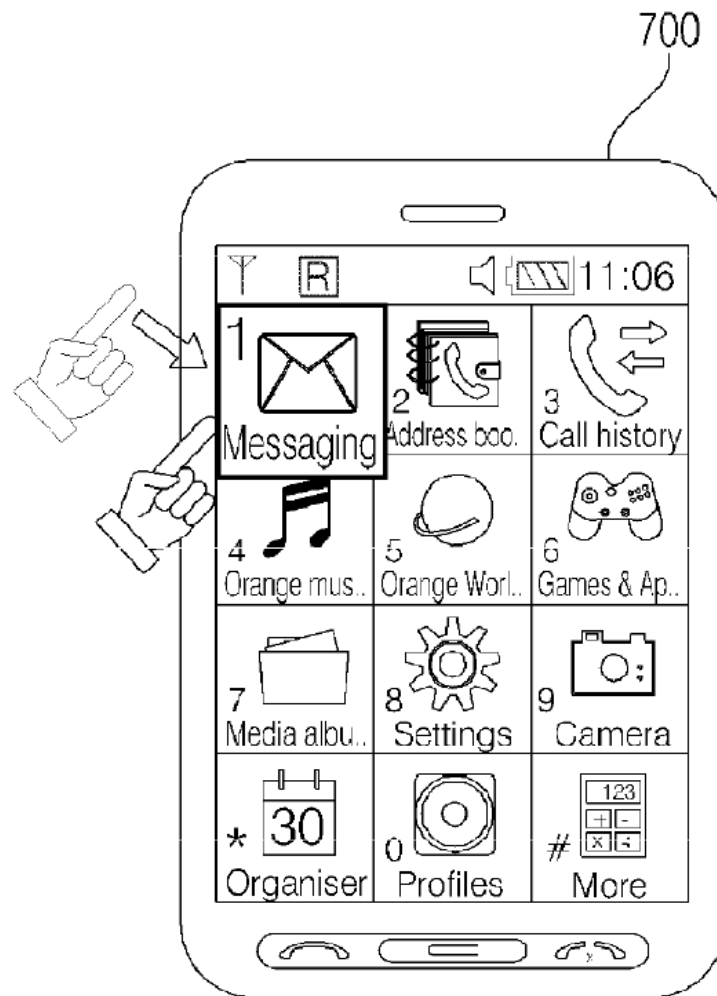


Figure 12(a).

Ku's Figure 7 generates different haptic effects depending on whether the terminal detects both a proximity and a touch signal at the location of a single icon or instead at different locations associated with different icons. Welch, ¶203.



If Ku detects the proximity of a user's finger to the location of a particular icon (step S505), Ku's processor causes a vibration signal (step S510). EX1008, 11:54-64. For example, each icon on the screen below is associated with a different "proximity area" above the icon, where the user's finger can be detected. *Id.*, 10:28-37; Welch, ¶204.

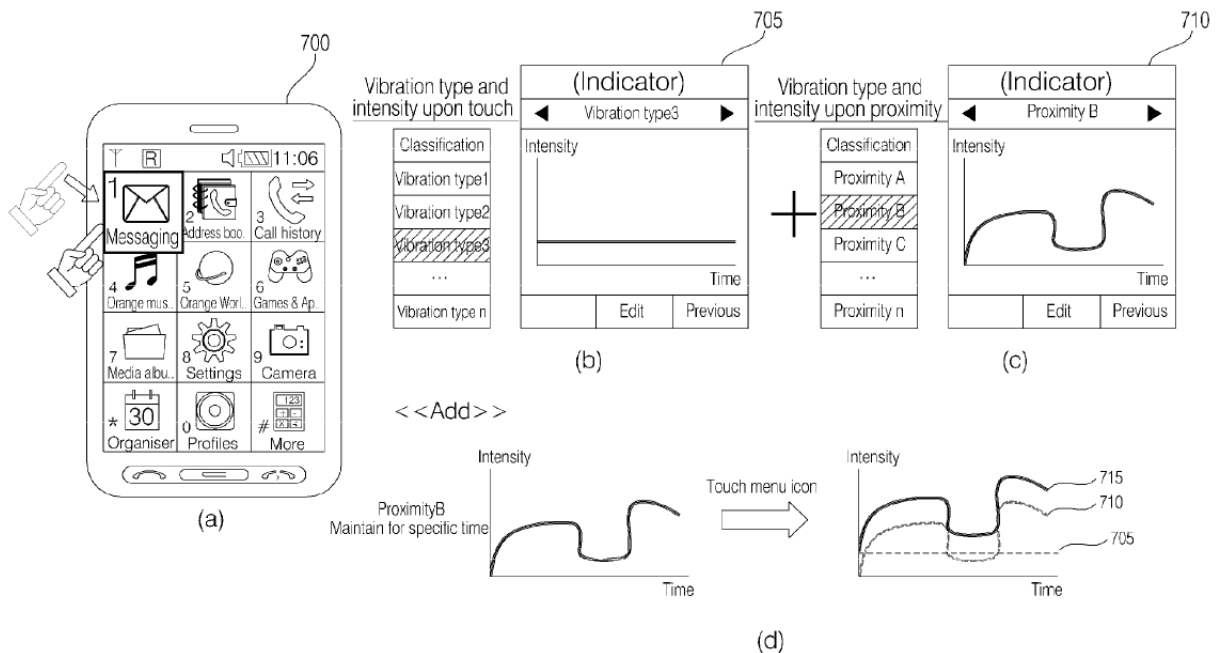


Ku's controller then determines whether a touch signal has been received corresponding to that same "specific menu icon of the location where the proximity signal was detected" (i.e., the determination in step S515). EX1008, 11:66-12:3. In

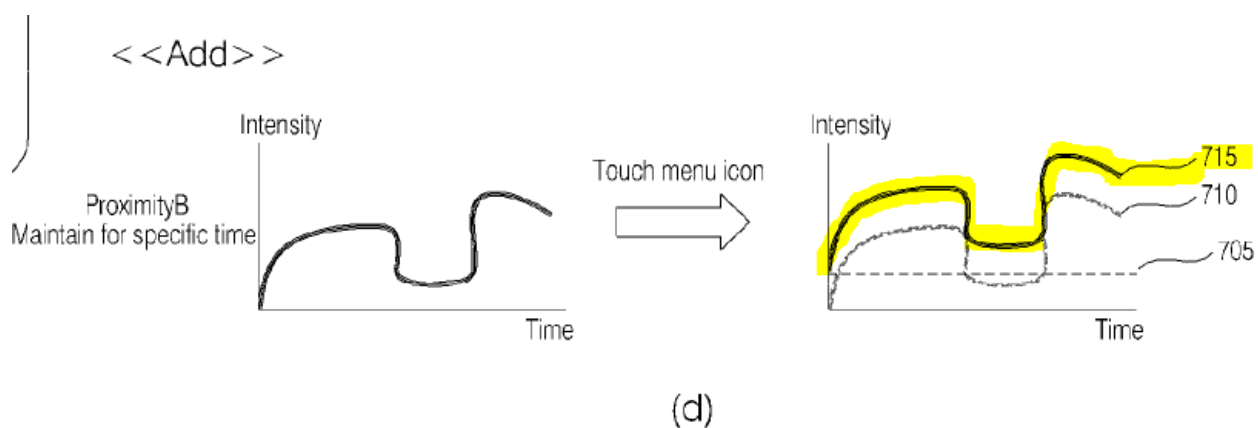
the figure above, for example, when a user wants to tap the “messaging” icon, the user’s finger may first approach that icon from above (causing the proximity sensor to detect a proximity signal associated with the icon), then move downward (causing the touch sensor to detect a touch signal at the same icon). In that scenario—with both the proximity and touch signals detected at the location of the same icon (i.e., detected from a single portion of the screen on which the icon is displayed), “vibration signals” corresponding to both the proximity and touch signals are “**combined** through the haptic module 157 (S520)” such that both “vibration signals may be added or subtracted and then output as vibration.” *Id.*, 12:18-28.

Ku’s Figure 12 illustrates a related embodiment: Welch, ¶¶205-206.

FIG.12



If a “proximity signal is maintained for a specific period of time” and then “a menu icon is touched,” vibration 715 is output. EX1008, 16:22-27. Vibration 715 is the sum of two different vibrations signals—one (710) “set with respect to the proximity signal” (*id.*, 16:19-20) and the other (705) “set with respect to the touch signal” (*id.*, 16:17-18). Figure 12(d)—enlarged and highlighted below—illustrates how touching the icon leads to vibration signals 705 and 710 being “**added** as output” (*id.*, 16:26).



The user experiences the combined vibration signal 715 only if the system detects both a proximity input **and** a touch input. Welch, ¶207.

As the upward shift in Figure 12(d)—reflecting the constant value of 705 being added to the value of 710 at each point in time—illustrates, vibration 715 is a single vibration output at each point in time. Welch, ¶208. This contrasts with the Choe reference applied during prosecution. As the Board noted, Choe disclosed “outputting effects sequentially” rather than teaching that the touch and proximity signals could be “combined.” EX1002, 1091. By contrast, Ku expressly discloses

a “***combined*** vibration signal corresponding to the proximity signal and the touch signal.” EX1008, 2:2-3. And Figure 12 details one such combined output. Welch, ¶208.

Ku’s Figure 12 indeed offers more detail concerning this combined output than the ’738 patent, which merely states without explanation that haptic effects associated with proximity and touch signals can be “combined.” EX1001, 11:35-37; Welch, ¶209.

2. The Pratt-Ku Combination

Even aside from Pratt’s two separate embodiments discussed in §VII.A.2.g, modifying Pratt to provide a single output signal reflecting both proximity and touch would have been obvious in view of either or both of (1) Ku’s Figure 7 or (2) Ku’s complementary Figure 12. Pratt’s Figure 4 illustrates a “pre-charging haptic generation operation.” EX1006, [0038]. When the device detects a finger at a “predetermined distance (Threshold P) from the touch surface,” Pratt begins “pre-charging the haptic actuator...according to a haptic profile for the anticipated time and location of the touch.” *Id.*, [0039]. If the device later (at time t2) detects the finger making contact, the device generates the haptic profile “faster” than it otherwise could. *Id.*

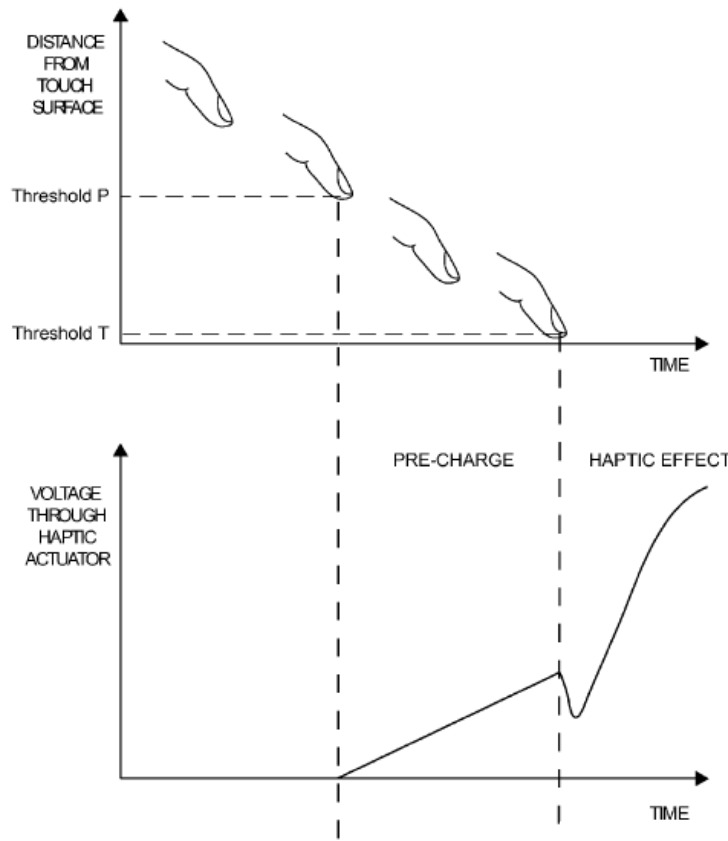
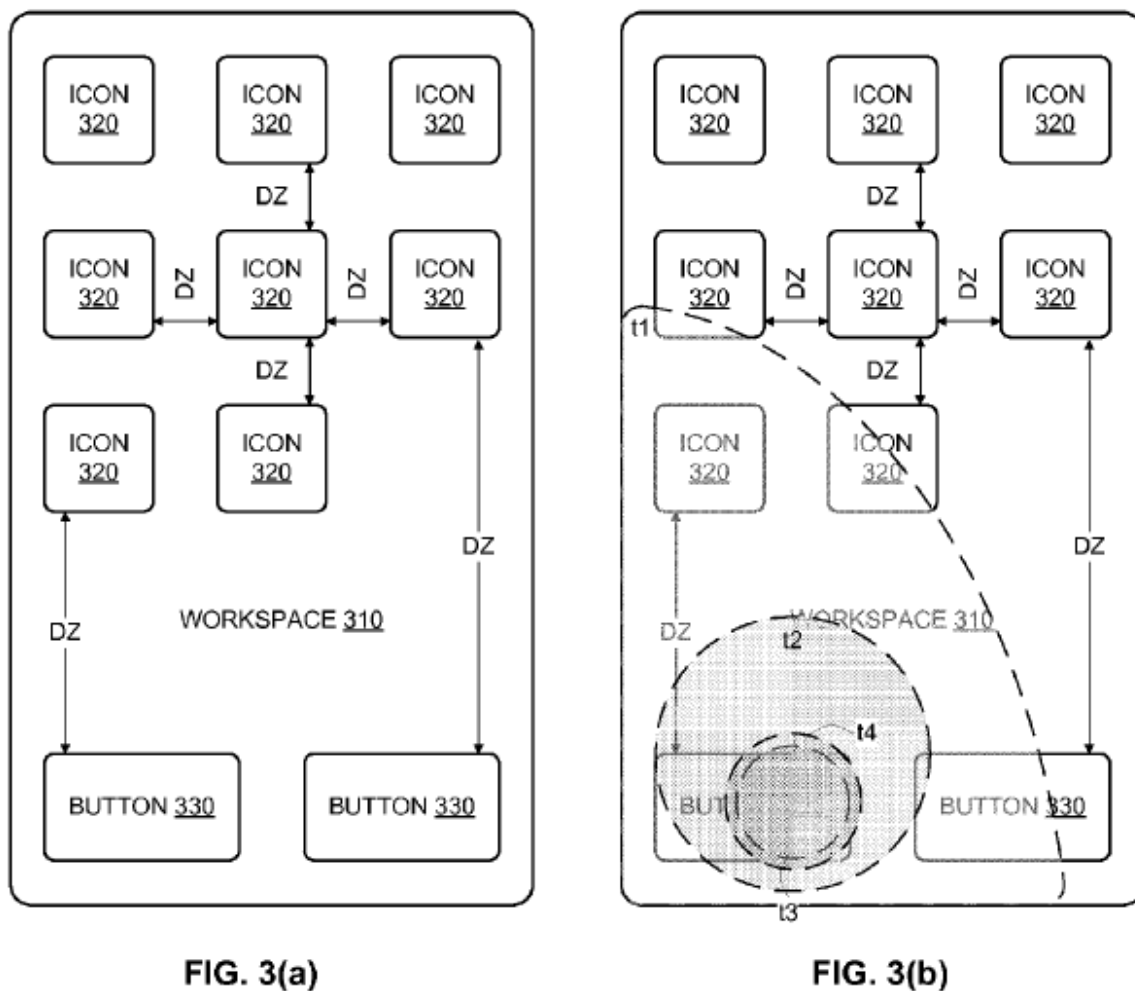


FIG. 4

While Pratt thereby reduces latency between the user touching the screen and feeling the haptic effect, Pratt’s system was ready for improvement using Ku’s method of “distinguishing input signals.” EX1008, 1:15-17. Pratt itself does not address the problem Ku discusses: “distinguish[ing] between different types of touch signals and proximity signals.” EX1008, 1:32-34. Given Ku (and in particular Ku’s Figures 7 and 12), however, POSAs would have had reason to use Pratt’s device to practice Pratt’s Figure 4 in such a way that one “haptic effect”—corresponding to Ku’s Figure 12(d)—is output if Pratt detects proximity and touch signals associated with the same menu icon (per step S520 in Ku’s Figure 7) and a different “haptic

effect” is output otherwise (per Ku’s step S525). Welch, ¶¶210-212. Pratt itself indeed discloses a device with a user interface including multiple icons:



Pratt, [0036]. When implemented according to Ku’s teachings, the combination (“Pratt-Ku”) outputs Ku’s vibration 715 if the device detects both proximity and touch signals from the portion of the screen associated with the same icon. For example, the workspace 310 in the annotated version of Pratt’s Figure 3(a) below closely parallels that of device 700 in Ku’s Figure 12(a):

Pratt Figure 3(a)
(annotated)

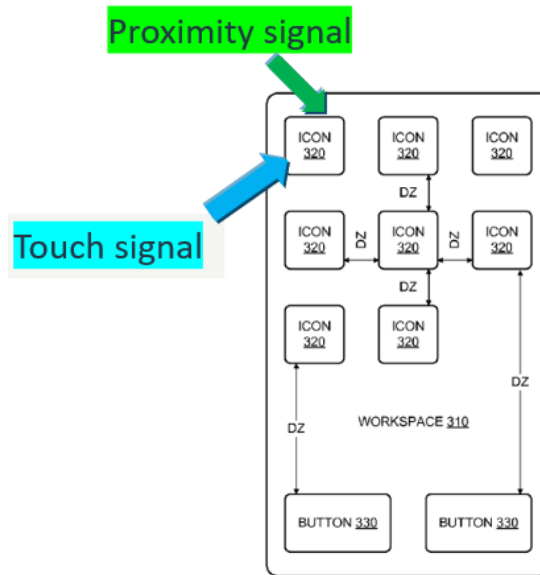
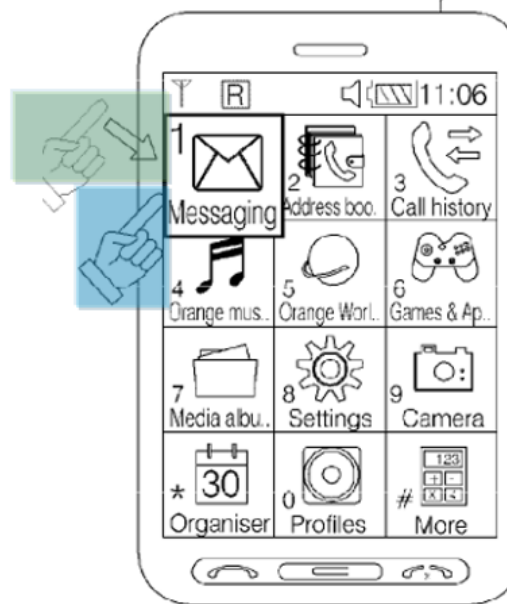


FIG. 3(a)

Ku Figure 12(a)
(annotated) 700



(a)

By contrast, if no touch signal was detected, the user would not feel vibration 715.

This combination (“Pratt-Ku”) yields a mobile device with Pratt’s reduced latency and Ku’s ability to distinguish input signals—quickly alerting users the moment they touch the portion of the screen above which their finger had been hovering. Welch, ¶212. POSAs would have recognized such an alert as desirable to indicate to users whether they touched the icon they intended to touch. *Id.*

POSAs would have had a reasonable expectation of success when practicing Pratt this way; Ku and Pratt are fully consistent and complementary. Welch, ¶¶213-217. In addition to the above-illustrated parallels in user interface, POSAs would have recognized that Pratt’s processor—with the proximity and touch classification modules—was suitable for implementing the decisional steps reflected in each of Ku’s Figures 7 and 12. Welch, ¶217. Implementing either of Ku’s algorithms in Pratt’s hardware would be a routine engineering task. Welch, ¶253; *Cywee Group Ltd. v. ZTE (USA), Inc.*, 90 F.4th 1358, 1363 (Fed. Cir. 2024).

3. Claims 1-3, 5-6, 14-15, and 19

Claims 1-3, 5-6, 14-15, and 19 (i.e., those anticipated by or alternatively obvious over Pratt per §VII.A) would also have been obvious over Pratt-Ku. Even aside from Pratt’s own disclosures as detailed in §VII.A concerning [1F], 15[F], and 19[F], Ku’s Figures 7 and 12 each disclose implementations that would have been obvious to implement in Pratt (as §VII.B.2 explains) such that Pratt’s processor

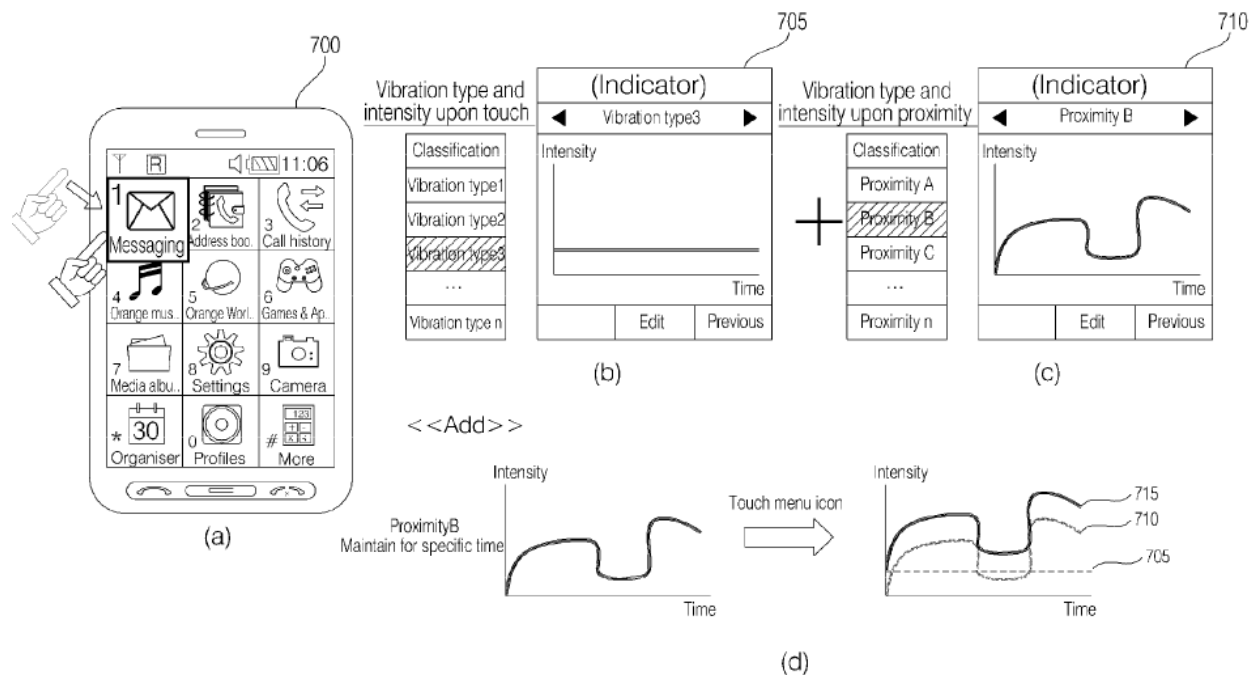
would be “*configured to generate a haptic output signal based at least in part on the first and second sensor signals*” as claimed. Welch, ¶219.

Ku’s Figure 7 illustrates how “if, as a result of the determination in S515, the touch signal has been input through the specific menu icon, the controller 180 outputs vibration in which a vibration signal corresponding to the proximity signal...and a vibration signal corresponding to the touch signal...***are combined through the haptic module 157 (S520)***.” Ku, 12:18-26; *see also* 20:25-47 (claimed “method of distinguishing input signals detected by a mobile terminal,” including “outputting a ***third vibration that is a combination of the first vibration and the second vibration***” if the “location...at which the proximity touch is received” is the “same” as the “location...at which the touch input is received”).

When implemented in Pratt, Ku’s Figure 7 would rely on Pratt’s haptic response search module 112.4 within processor 112; module 112.4 would receive data from proximity and touch classification modules 112.1 and 112.2, then generate a “haptic command” (i.e., a “*haptic output signal*”) “*based at least in part on the first and second sensor signals*.” Welch, ¶¶221-222.

Ku’s Figure 12 illustrates one exemplary combination of a first proximity-related vibration (710) and a second touch-related vibration (705). Together, the combined first and second vibrations constitute vibration 715:

FIG.12



**Pratt Figure 3(a)
(annotated)**

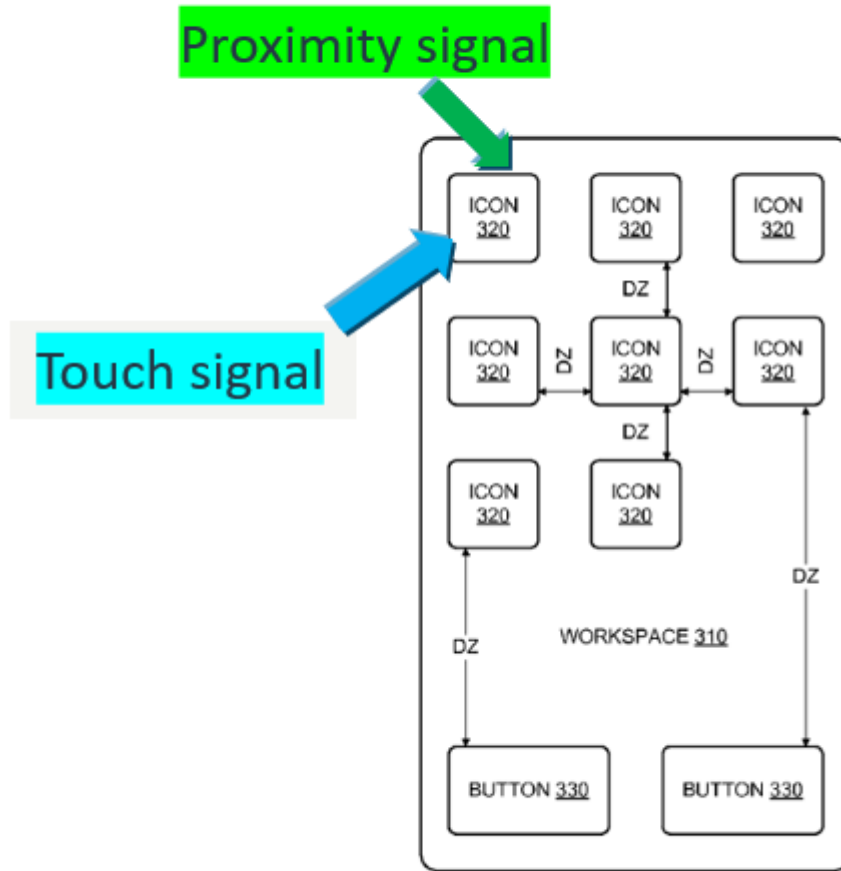
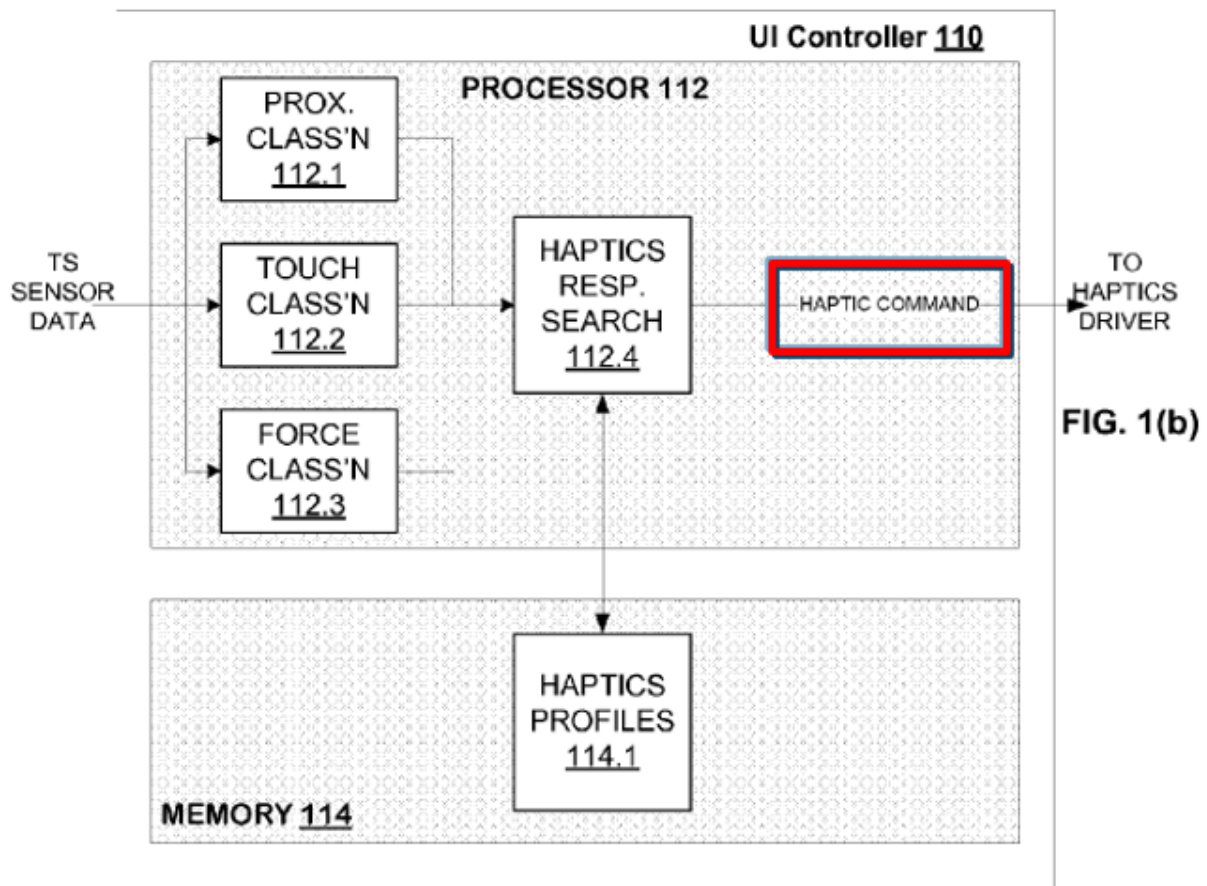


FIG. 3(a)

Welch, ¶¶223-224.

To trigger vibration 715, Pratt-Ku would send a single haptic output signal (i.e., a “haptic command” in Pratt’s terminology) from processor 112 to the haptics driver. Welch, ¶225.

**Pratt Figure 1(b)
(annotated)**



Generating a single “haptic output signal” calling for Ku’s vibration 715 based on both the proximity and touch signals (i.e., the “*first and second sensor signals*” recited in [1F], [15F], and [19F]) and sending it to the haptics driver would have been more efficient and flexible than sending multiple haptic output signals to the haptics driver and requiring the driver to process them into a single output. Welch, ¶226; EX1020, [0062] (disclosing “combiner/sequencer” within processor for combining multiple haptic effects). It would also simplify the driver design by reducing the required processing power. Welch, ¶226.

The reasons why Pratt satisfies the other elements of claims 1, 15, and 19 (i.e., all aside from [1F], [15F], and [19F]) and those of dependent claims 2-3, 5-6, and 14 remain unchanged when using Ku's Figures 7 and 12 to implement the "haptic effect" in Pratt's Figure 4. Welch, ¶227.

4. Claims 4 and 16: "the haptic output signal is designed to direct a user to contact the touch-sensitive device at a particular location"

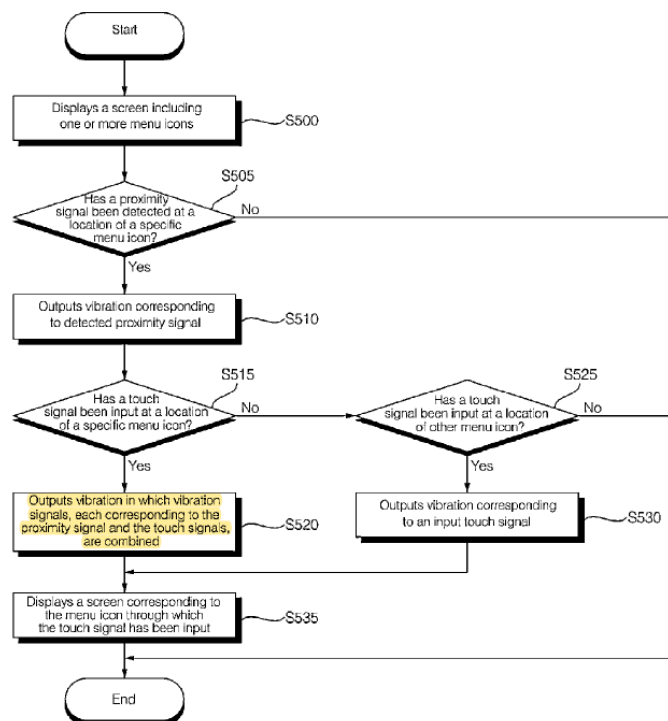
Pratt-Ku renders claims 4 and 16 obvious, as the haptic signal generated per Ku's Figure 7 (incorporated into Pratt-Ku per §VII.B.2) "*is designed to direct a user to contact the touch-sensitive device at a particular location*" as claimed. Welch, ¶¶228-229. Ku's signal directs users to a particular "menu icon," as the haptic output signal is generated only if based on "the determination in S515" [i.e., step S515 in Figure 7)] it is determined that the touch signal received by the controller 180 corresponds to the same icon as the proximity signal. 11:54-12:26; Welch, ¶228. By contrast, if the touch signal corresponds to a different icon, Pratt's device implementing Ku's Figure 7 outputs a vibration corresponding to just the touch signal at S530 without combining the two vibration signals. 11:54-12:17; Figure 7; Welch, ¶229. This would help alert the user when their finger accidentally misses the icon they intended to press and mistakenly activates a neighboring icon, for example, thus directing the user to try again at the particular intended location. Welch, ¶229.

C. Ground 3: Ku Renders Claims 1-5, 14-16, and 19 Obvious

Claims 1-5, 14-16, and 19 are obvious over Ku⁴ in view of POSAs' knowledge. As §VII.B.1 explains, Ku outputs “a *combined* vibration signal corresponding to the proximity signal *and* the touch signal” if the “locations” of both signals are the same. 1:61-2:5. Welch, ¶230.

Figure 7 illustrates one such embodiment, and in particular outputting “combined” vibration based on both the “proximity signal” and the “touch signal” being detected from the on-screen “location of a specific menu icon.”

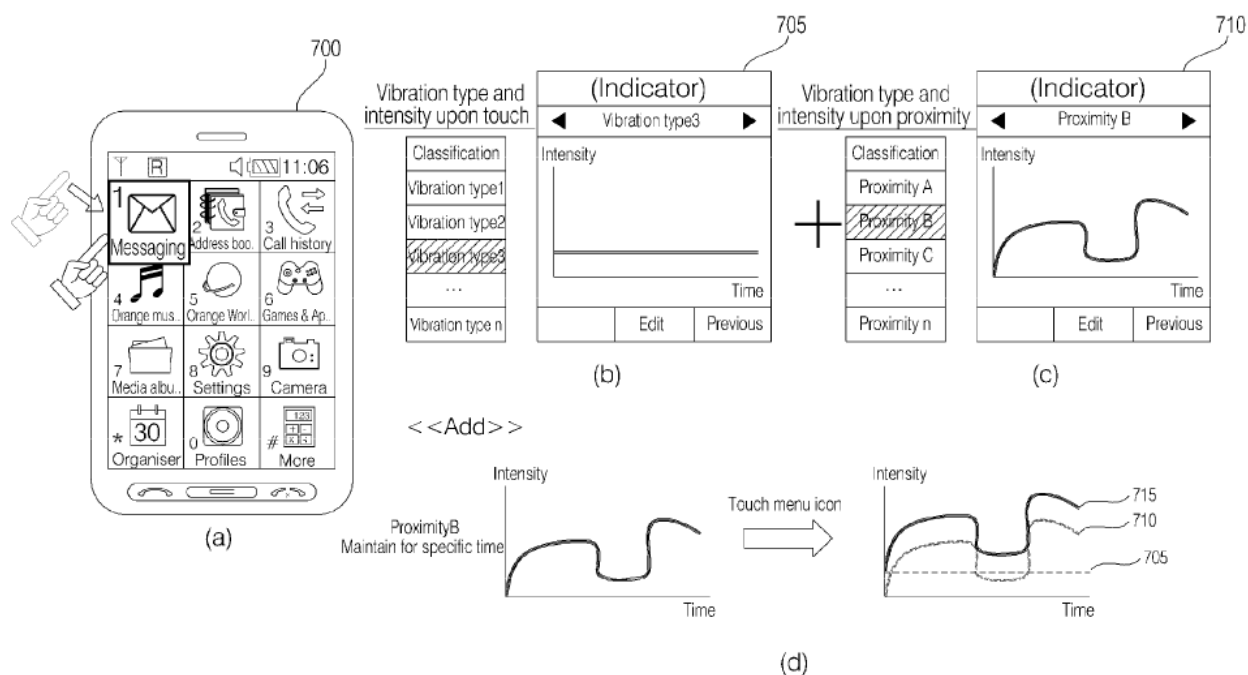
FIG. 7



⁴ Unless otherwise indicated, citations in §VII.C are to Ku.

Separately, Figure 12 illustrates outputting vibration 715 if “a proximity signal is maintained for a specific period of time” (e.g., if a user’s finger hovers over the screen) and then “a menu icon is touched.” 16:22-27:

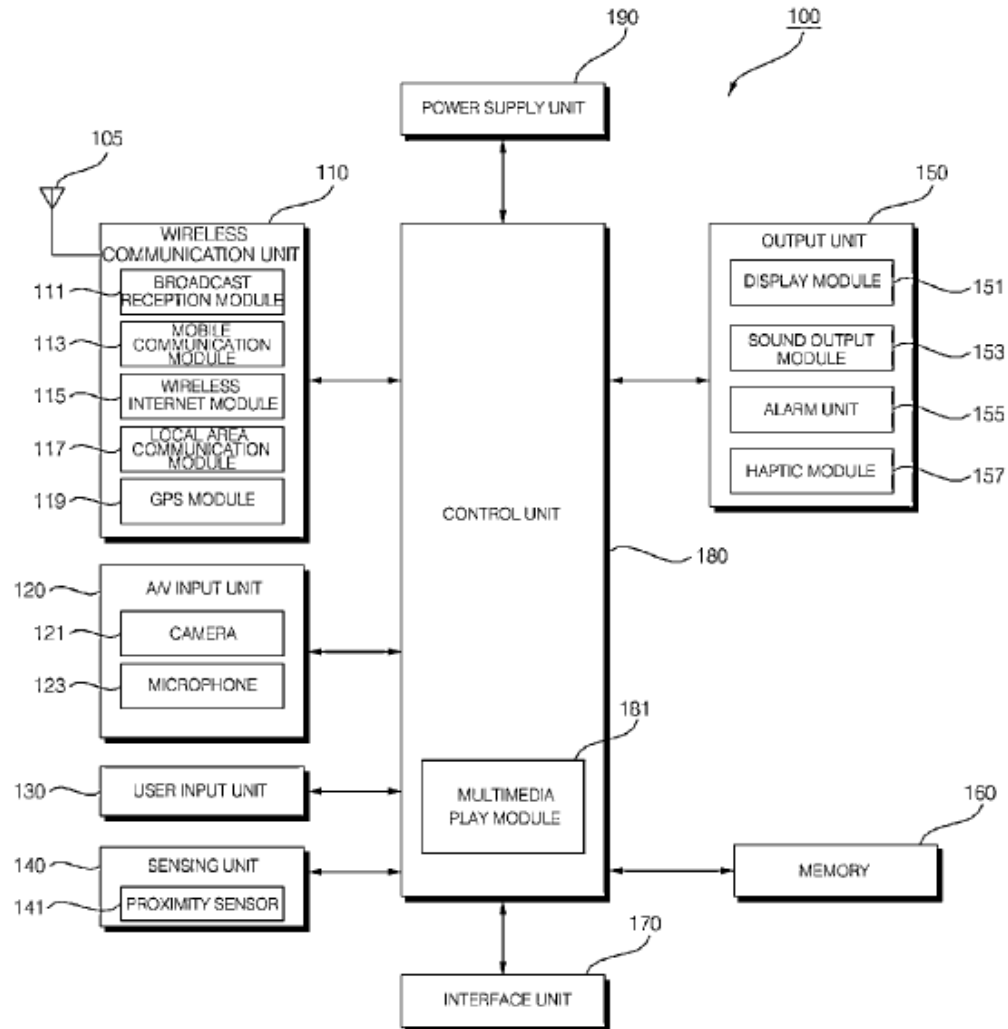
FIG.12



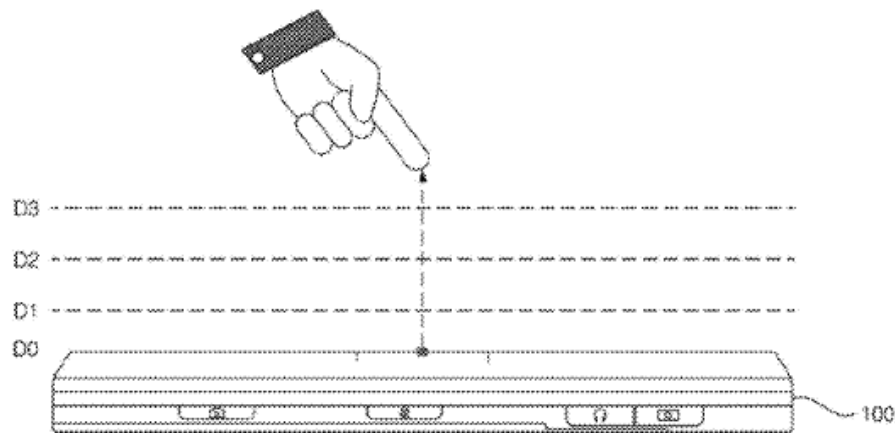
The only way a user experiences vibration 715—which is more intense than vibration 710 associated with the proximity signal alone—is if Ku receives a touch signal after having previously received the proximity signal. Welch, ¶224. In that scenario, vibrations 705 and 710 are “added” as output as Figure 12(d) illustrates. 16:22-27.

Ku's Figure 1 also discloses mobile terminal 100 for implementing Figures 7 and 12:

FIG. 1



Terminal 100 includes proximity sensor 141, which works by monitoring capacitance changes. 5:39-44; Figure 4 (illustrating proximity sensor's operation):



2:55-56. If the proximity sensor senses an approaching finger, it outputs a “proximity signal.” 10:3-10.

Ku’s terminal also includes output unit 150 with display unit 151, which may comprise a “touch screen panel” functioning as a touch sensor—“monitor[ing] whether there is a touch input and, [if so], send[ing] corresponding signals to the touch screen panel controller.” 5:59-6:4. That controller “processes” such signals and “transmits the corresponding data to the controller 180,” which determines “whether there has been a touch input.” 6:4-9.

Ku’s terminal further includes haptic module 157, which “generates a variety of haptic effects” such as a “vibration signal,” which may include “different pieces” (i.e., of vibration). 6:45-52; Welch, ¶234. This disclosure tracks Ku’s above-discussed Figures 7 and 12 and the output of combined vibration 715. Welch, ¶234.

As previously discussed, Ku’s Figures 7 and 12 are fundamentally different from Choe’s disclosures, which (as the Board determined during prosecution)

describe “outputting effects *sequentially*” rather than teaching that the proximity and touch signals could be “*combined*.” EX1002, 1091. Unlike Choe, Ku expressly discloses integrating the proximity and touch signals into a “*combined* vibration signal.” 1:61-2:5. And Figure 12 expressly illustrates such combined vibration.

While Ku provides disclosures meeting [1F], [15F], and [19F] that Choe lacks, Ku is otherwise comparable to Choe. Ku’s Figure 1 indeed is essentially identical to Choe’s Figure 1. Welch, ¶235. And aside from claim elements [1F], [15F], and 19[F] (requiring a haptic output signal based on first *and* second sensor signals, as explicitly disclosed in Ku’s Figures 7 and 12 but absent from Choe), the Office repeatedly determined (and applicants never disputed) that Choe disclosed or rendered obvious all other elements of the challenged claims. *See* §V.C.

1. Claim 1

a. [1PRE]: “A device comprising:”

Ku discloses a “*device*” as claimed. Welch, ¶¶236-237.

For example, Ku describes a “mobile terminal” for implementing “[a] method of distinguishing input signals.” Abstract; Welch, ¶237; *see also* 1:15-17 (“present invention relates generally to mobile terminals”). Ku’s Figure 1 illustrates such a terminal, which POSAs would understand as a “*device*.” Welch, ¶237; *see also* EX1001, 3:60-61.

b. [1A]: “a proximity sensor...;”

Terminal 100 includes “*a proximity sensor*” that meets [1A]. Welch, ¶¶238-240.

Figure 1’s terminal includes proximity sensor 141, which can “detect an approaching object...without mechanical contact.” 5:39-42. “[W]hen a user’s finger approaches the display area 151, the proximity sensor 141 senses such approach and outputs a proximity signal” (a “*first sensor signal*”). 10:3-7. This “proximity signal” may reflect the distance from the finger to display unit 151, such that it “*detect[s] a non-contact interaction*” with display unit 151. Welch, ¶¶239-240; *see also* 11:54-58 (discussing “proximity signal” in connection with Figure 7). Further, “display unit 151 operates as a touch screen” (8:27-30) and is accordingly a “*touch-sensitive device*.” Welch, ¶238.

c. [1B]: “a touch sensor...”

Ku’s mobile terminal 100 includes “*a touch sensor*” that meets [1B]. Welch, ¶¶241-245.

As §VII.C.1.b explains, display unit 151 constitutes a touch-sensitive device. It may “comprise a touch screen panel, a touch screen panel controller, or other touch screen component.” 5:64-66; *see also* 5:66-6:1. The panel “monitor[s] whether there is a touch input and, when there is a touch input, sends corresponding signals to the touch screen panel controller;” thus display unit 151 is an “*input device*.” 6:1-6:4;

Welch, ¶242. The panel controller processes those “signals received from the touch screen panel and transmits the corresponding data to the controller 180,” which assesses “whether there has been a touch input.” 6:4-9.

The panel and its controller together therefore constitute a “*touch sensor capable of detecting a touch with the*” display unit and outputting a signal (“*second sensor signal*”) as “data” transmitted by the touch screen panel controller to controller 180. 6:1-9; Welch, ¶¶243-244. Ku’s Figure 7 illustrates how such second sensor signal permits controller 180 to determine “whether a touch signal has been input through the specific menu icon of the location where the proximity signal was detected in step S505.” 11:64-12:3.

Identifying the panel and its controller together as the “*touch sensor*” is consistent with the ’738 patent, which describes how “touch sensor 108 may detect” various types of information and “*incorporate this information into the signal* transmitted to the processor 102.” EX1001, 4:39-41. According to the ’738 patent, therefore, the “*second sensor signal*” from the “*touch sensor*” may be pre-processed before it reaches the ’738 patent’s processor; it need not comprise raw data (e.g., capacitance values). Welch, ¶245.

Ku’s terminal 100 would also satisfy [1B] even if the “*second sensor signal*” required raw data. The ’738 patent discloses that Figure 5 (concerning a touch sensor signal) “may be implemented by a group of processors.” EX1001, 11:9-11; *see also*

id. 13:21-57 (“In one embodiment, a computer may comprise a processor or processors.... The processor, and the processing, described may be in one or more structures, and may be dispersed through one or more structures.”). Under this approach, Ku’s touch screen panel constitutes the “*touch sensor*” and Ku’s touch screen panel controller together with controller 180 constitutes the “*processor*” as addressed below in [1D]. *Convolve, Inc. v. Compaq Computer Corp.*, 812 F.3d 1313, 1321 (Fed. Cir. 2016).

d. [1C]: “a haptic output device...”

Ku’s terminal 100 includes “a *haptic output device*” that meets [1C]. Welch, ¶¶246-249.

Ku’s “haptic module 157 generates a variety of haptic effects.” 6:45-48. For example, Figure 7 illustrates how “controller 180” commands haptic module 157 to output a “vibration signal.” 11:54-12:26; Welch, ¶247. In step S520, “vibration signals corresponding to the proximity signal and...the touch signal” are “combined through the haptic module 157” if the controller has determined that the proximity and touch signals correspond to the same menu icon. 12:18-24; *see also* Figure 7 (S520: “Outputs vibration in which vibration signals, each corresponding to the proximity signal and the touch signals, are combined.”). Such “vibration” is a “*haptic effect*” output by the haptic module (“*haptic output device*”). Welch, ¶¶248-249; *see also* §VII.C.1.g (concerning “haptic output signal” per [1F]). POSAs would

have understood from Ku's disclosure that controller 180 "outputs a vibration signal...through the haptic module" (12:13-15) by transmitting a command signal ("*a haptic output signal*") to haptic module 157 that causes haptic module 157 to output the combined vibration ("*a haptic effect*"). Welch, ¶247. POSAs would also have understood that Ku's haptic module is "*configured to receive*" the command signal. *Id.*, ¶246.

e. [1D]: "a processor configured to:"

POSAs would have implemented Ku's terminal 100 with a "*processor configured to*" perform claim 1's remaining requirements, as discussed below concerning Ku's Figures 7 and 12. Welch, ¶¶250-253.

Figure 1 illustrates mobile terminal 100 including "control unit 180," which Ku elsewhere calls "controller 180." *E.g.*, 3:57 (referencing Figure 1); 6:4-9. POSAs would understand "control unit 180" and "controller 180" as the same component. Welch, ¶251. "[C]ontroller 180 typically controls the operation of each of the elements and controls an overall operation of the mobile terminal 100." 7:31-33.

While Ku does not expressly describe "controller 180" as a "*processor*," POSAs would have known processors as a typical, conventional, and expedient implementation of a controller / control unit and thus would have had reason to implement controller 180 via a processor. Welch, ¶252; EX1028, [0023], [0026]

(teaching implementation of “controller” as “processor”). POSAs further would have had a reasonable expectation of success given their awareness that such processors (e.g., CPUs) could readily perform Ku’s specified functions and were routinely incorporated in mobile electronic devices. Welch, ¶253.

f. [1E]: “receive the first sensor signal and the second sensor signal”

Ku’s controller 180 (obvious to implement as a processor, *see* §VII.C.1.e) is configured to “*receive the first sensor signal*” as well as the “*second sensor signal*” as claimed. Welch, ¶254.

Concerning the “*first sensor signal*,” “controller 180 determines whether a proximity signal has been detected at the location of a specific one of the one or more menu icons through the proximity sensor 141.” 11:54-57; Welch, ¶255.

Concerning the “*second sensor signal*,” the touch screen panel controller (part of the touch sensor, *see* §VII.C.1.c) transmits “data to the controller 180, so that the controller 180 may determine[] whether there has been a touch input.” 6:1-9. The “data” sent to the controller constitutes the “*second sensor signal*” (based on input from the touch sensor). Welch, ¶256; *see also* §VII.C.1.c (detailing why “*second sensor signal*” need not reflect raw data).

g. [1F]: “generate a haptic output signal based at least in part on the first and second sensor signals; and”

Ku’s controller 180 is configured to “*generate a haptic output signal based at least in part on the first and second sensor signals*” as claimed. Welch, ¶257. The discussion in §VII.B.3 concerning Ku’s Figures 7 and 12 in connection with Pratt-Ku also applies here; the only difference is that Ku’s controller 180 rather than Pratt’s processor 112 generates the haptic output signal. Welch, ¶258. Using controller 180 to generate a single “*haptic output signal*”—for example, a command signal causing vibration 715—based on both the proximity and touch signals (i.e., the “*first and second sensor signals*”) and sending it to the haptics driver would have been more efficient than sending multiple haptic output signals to the haptics driver and requiring the driver to process them into a single output. *See supra* §VII.B.3; Welch, ¶259.

h. [1G]: “transmit the haptic output signal to the haptic output device.”

Ku’s controller 180 is configured to “*transmit the haptic output signal to the haptic output device*” as claimed. Welch, ¶¶260-262. Concerning Figure 7, Ku describes how a “vibration signal corresponding to the proximity signal” along with “a vibration signal corresponding to the touch signal...are combined through the haptic module” and “output as vibration.” 12:20-26. Similarly, Ku’s claim 21 recites a controller together with “a haptic module for...outputting a third vibration

that is a combination of the first vibration and the second vibration.” 22:57-64. These disclosures track the explanation in §VII.C.1.g why at minimum it would have been obvious to implement Ku’s Figures 7 and 12 by sending a single haptic output signal from controller 180 to the haptic module (*haptic output device*) rather than sending two different data signals from the controller to the haptic module. Welch, ¶262. Ku indeed consistently describes the controller as outputting “combined vibration signals through the haptic module 157.” 11:43-47.

2. Claim 2: “proximity sensor...integrated into the touch-sensitive device”

Ku renders claim 2 obvious, as POSAs would understand that Ku’s “*proximity sensor [141] is integrated into the touch-sensitive device [151]*” as claimed. Welch, ¶263. Figure 4 illustrates how “when a user’s finger approaches the display unit 151, the proximity sensor 141 senses such as approach and outputs a proximity signal.” 10:3-7. As detailed above, display unit 151 is a “*touch-sensitive device*” as claimed. Welch, ¶263. POSAs would have understood that the sensor is integrated into the display unit to enable detection of fingers approaching the display. Welch, ¶263.

At minimum, the claimed configuration would have been obvious over Ku’s Figure 7, which in step 505 “determines whether a proximity signal has been detected at the location of a specific one of the one or more menu icons through the proximity sensor 141.” 11:54-57. Integrating the proximity sensor into the touch-

sensitive device ensures accuracy in detecting a proximity signal at the location of a specific menu icon, all of which are displayed on “a screen,” within “display unit 151.” 11:49-50; Welch, ¶263.

3. Claim 3: “proximity sensor comprises one of a capacitive sensor or an optical sensor”

Ku renders claim 3 obvious by teaching that the “*proximity sensor comprises...a capacitive sensor*” as claimed. Welch, ¶264.

Ku teaches that proximity sensor 141 may detect objects based on “the rate of capacitance” (5:42-44), which POSAs would have understood to disclose a *capacitive sensor* as claimed. Welch, ¶265. This teaching is generic to all of Ku’s embodiments and applies to Figures 7 and 12. Welch, ¶265.

4. Claim 4: “haptic output signal is designed to direct a user to contact the touch-sensitive device at a particular location”

Ku renders claim 4 obvious by teaching that the haptic output signal discussed in §VII.C.1.g “*is designed to direct users to contact the touch-sensitive device at a particular location*” as claimed. Welch, ¶266. The analysis in §VII.B.4 concerning Figures 7 and 12 implemented in Pratt-Ku—including how the vibration signal is designed to direct users to a particular icon location—applies equally to Ku itself.

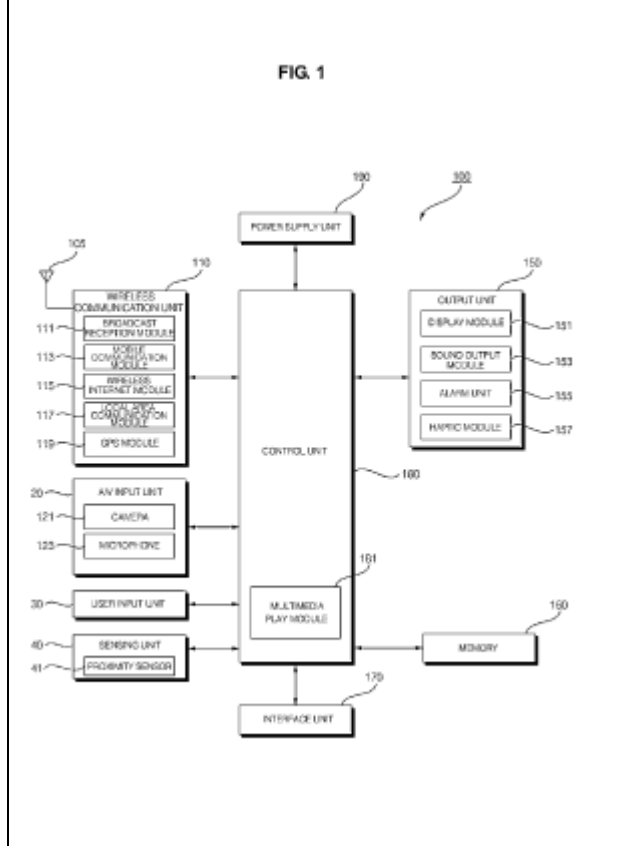
5. Claim 5: “integrated sensor comprises the proximity sensor and the touch sensor”

In view of POSAs’ knowledge, it would have been obvious to implement Ku such that Ku’s capacitive sensor serving as the proximity sensor (*see* §VII.C.3) also

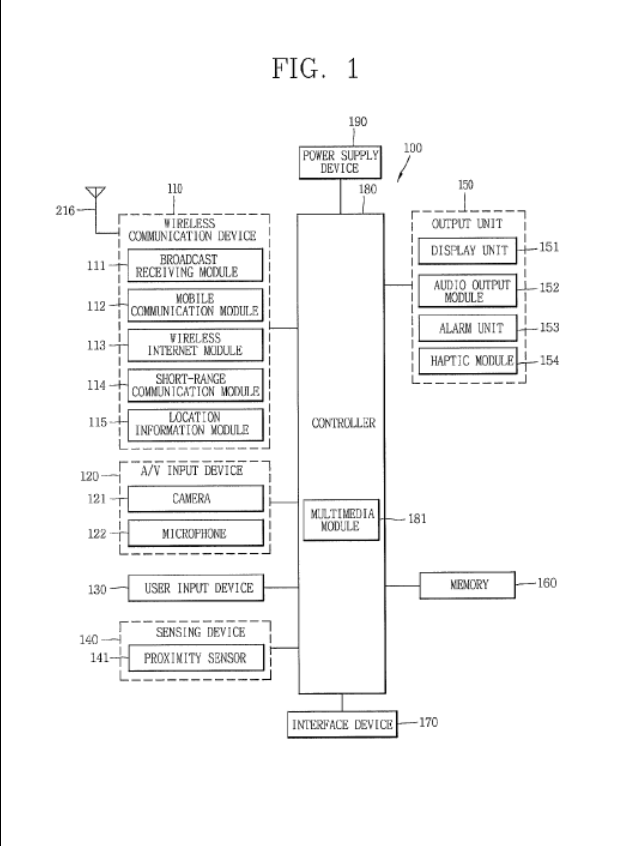
constitutes Ku’s touch sensor—making it an “*integrated sensor*” that “*comprises the proximity sensor and the touch sensor.*” Welch, ¶267. It was well known that capacitive sensors could reliably enable detection of both non-contact (i.e., proximity) and contact events involving users’ fingers. Welch, ¶268; EX1006, [0021]-[0022]; EX1018, [0053], FIG. 9; EX1019, FIGs. 5A, 5B, 6A, 6B, 10:1-14, 13:38-55. Relying on such a capacitive sensor as both the proximity sensor and the touch sensor would reduce costs and design complexity while leaving operations unchanged. Welch, ¶268. Ku’s above-discussed Figures 7 and 12 are agnostic as to the source of the proximity and touch signals. *Id.*

POSAs would have had a reasonable expectation of success in implementing Ku with an integrated sensor, as Lee (EX1009) confirms. Lee is similar to Ku in many respects and assigned to the same assignee. Lee’s Figure 1 is essentially identical to Ku’s Figure 1 (Welch, ¶269):

Ku Figure 1



Lee Figure 1



Lee also includes proximity sensor 141 and a “touch sensor.” [0038]; [0044]. The touch sensor (a “touch sensitive sensor”) may be integrated with display 151 to constitute “a touch screen.” [0044]; *see also* Figure 4.

Lee’s touch screen may be “implemented as a capacitance type,” such that it also serves as a “proximity sensor.” [0048]. Thus both touch and proximity sensors are integrated in the touch screen. Welch, ¶270. And like Ku, Lee distinguishes between “proximity” versus “contact” touches. [0049]; *see also* [0090].

Such disclosures corroborate POSAs’ reasonable expectation of success in implementing either Ku’s Figure 7 or 12 with an integrated capacitive sensor comprising proximity and touch sensors. Welch, ¶271.

6. Claim 14

a. [14A] “touch sensor...capable of detecting a pressure”

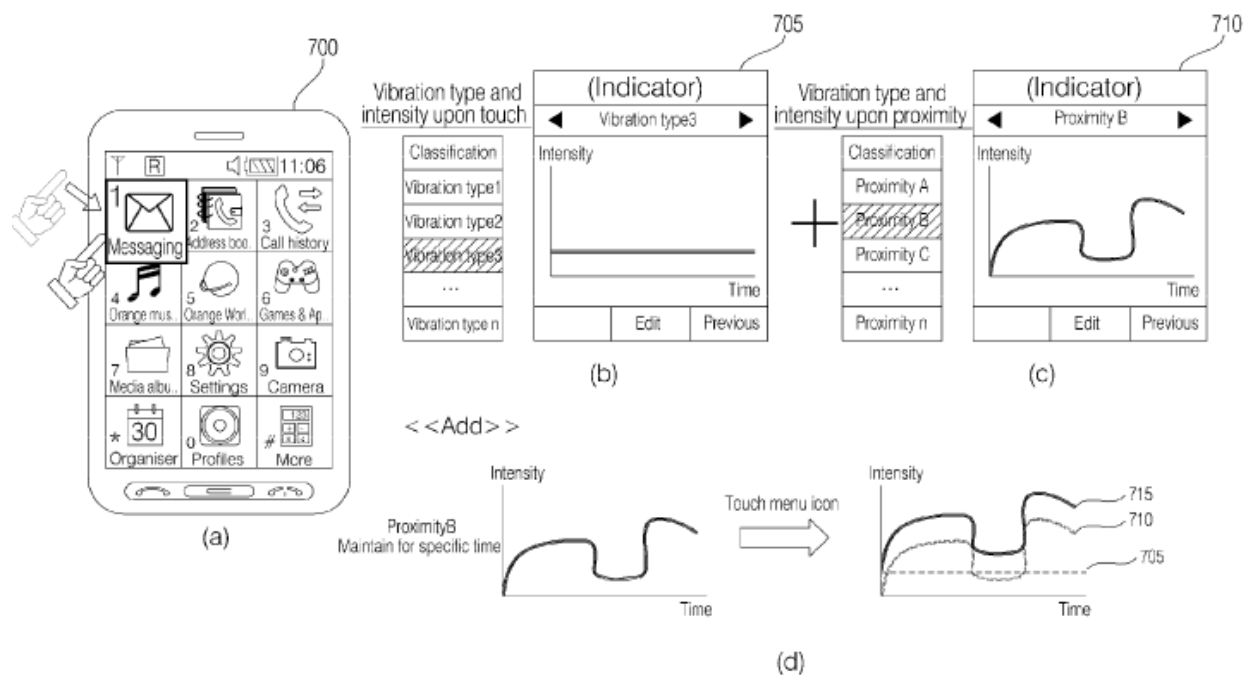
Ku’s touch sensor “*is capable of detecting a pressure,*” and at minimum it would have been obvious to incorporate such capability. Welch, ¶¶272-273. Ku discloses that “different vibration signals may be assigned touch signals...input with a specific pressure.” 11:13-15. Capacitive sensors (as Ku discloses, *see* §VII.C.3) were capable of detecting pressures. Welch, ¶272; EX1006, [0047]; EX1012, 1:48-51.

b. [14B] “haptic output signal is based at least in part on the detected pressure”

It would have been obvious to implement Ku’s Figures 7 and 12 such that “*the haptic output signal is based at least in part on the detected pressure*” as claimed. Welch, ¶¶274-278. It was well known to distinguish between intentional versus inadvertent touches by defining a threshold pressure below which the touch signal would not trigger a response. EX1016, [0087] (“pressure threshold...to avoid accidental actuation”); EX1017, [0035] (“predetermined pressure or greater” to “reduce the occurrence of erroneous input due to the user mistakenly touching the touch surface”); Welch, ¶275. When implementing Figure 7, it would have been

obvious to combine the “vibration signals, each corresponding to the proximity signal and the touch signals” and output the combined “vibration” (per S520) only if a threshold pressure is reached—thereby distinguishing inadvertent touches. Welch, ¶276. Similarly, when implementing Figure 12, it would have been obvious to send a haptic output signal calling for vibration 715 only if a user taps the portion of the screen corresponding to the “Messaging” icon with sufficient force—generating a pressure beyond a defined threshold—to indicate the user intentionally rather than inadvertently tapped this icon.

FIG. 12



Welch, ¶276. In this implementation, the “*haptic output signal is based at least in part on the detected pressure*” because no such haptic output signal calling for vibration 715 would be sent if the pressure is below a defined threshold. *Id.*, ¶277.

7. Claim 15

Claim 15 recites a method with elements tracking those in apparatus claim 1. Claim 15 would have been obvious based on Ku’s above-discussed disclosures.

a. [15PRE]: “A method comprising”

If the preamble is limiting, Ku discloses a “*method*” as claimed. Welch, ¶279. Ku’s Figure 7 illustrates a “method of distinguishing input signals associated with different display locations.” 11:46-48.

b. [15A]: “detecting, by a proximity sensor, a non-contact interaction with a touch-sensitive device”

Ku discloses [15A] as claimed. Welch, ¶280. Figure 7 discloses using “proximity sensor 141” to “determine whether a proximity signal has been detected at the location of the specific one of the one or menu icons” on a touch screen (a *touch-sensitive device*). 11:54-57; Welch, ¶280. *See also* §VII.C.1.b (concerning [1A]).

c. [15B]: “detecting, by a touch sensor, a touch on the touch-sensitive device”

Ku discloses [15B] as claimed. Welch, ¶281. Figure 7 discloses using a touch sensor (*see* §VII.C.1.c concerning [1B]) to determine whether a touch was received

at the same portion of the touchscreen (corresponding to the same menu icon) as the proximity signal or instead at a different portion. 12:11-20; Welch, ¶281.

d. [15C]-[15G]

Ku renders [15C]-[15G] obvious as claimed. Welch, ¶¶282-287. These elements require a “processor” satisfying certain functional requirements. It would have been obvious to implement Ku’s controller 180 as a “processor.” See §VII.C.1.e. Concerning the functional elements:

[15C] In Figure 7’s step “S505,” Ku’s controller “determines whether a proximity signal has been detected at a specific one of the one or more menu icons through the proximity sensor 141.” 11:54-57. This involves “*transmitting a first sensor signal associated with the non-contact interaction to*” Ku’s controller. Welch, ¶283. If Ku’s proximity sensor 141 detects a non-contact interaction, it “outputs a proximity signal.” 10:4-6. The proximity sensor is connected to the controller (as Figure 1 reflects).

[15D] In Figure 7’s step “S515,” Ku’s controller “determines whether a touch signal has been input through the specific menu icon of the location where the proximity signal was detected in step S505.” 11:66-12:2. This involves “*transmitting a second sensor signal associated with the touch to*” Ku’s controller. Welch, ¶284. Ku’s touch screen panel “monitor[s] whether there is a touch input” and—if so—“sends corresponding signals to the touch screen panel controller,”

which processes them and “transmits the corresponding data to the controller 180.” As §VII.C.1.c explains, each of (1) the touch panel alone and (2) the combination of the panel and the controller constitute a “touch sensor” within the meaning of the ’738 patent.

[15E] As §VII.C.1.f explains, Ku’s controller is configured to “*receive the first sensor signal*” (from the proximity sensor) and “*second sensor signal*” (from the touch sensor). Welch, ¶285. It “controls” the “overall operation of [Ku’s] mobile terminal.” 7:31-33.

[15F] As §VII.C.1.g explains, controller 180 is configured to “*generate a haptic output signal based at least in part on the first and second sensor signals.*” Ku’s Figure 7 illustrates this method, and Figure 12 discloses one particular embodiment. Welch, ¶286. Vibration 715 in Figure 12 is output only if “after the proximity signal is maintained for a specific period of time, a menu icon is touched.” 16:22-24. As §VII.C.1.g explains, it would have been obvious to implement this disclosure with a single haptic output signal sent from controller 180 to Ku’s haptic module as it would have been more efficient by reducing the required processing power in the driver and the haptic module. Welch, ¶¶226, 259.

[15G] As discussed immediately above and in §VII.C.1.h, it would have been obvious for Ku’s controller to be configured to “*transmit the haptic output signal to the haptic output device*” when implementing Ku’s Figures 7 and 12

because sending a single haptic output signal from controller 180 to Ku's haptic module would be more efficient than sending multiple signals. Welch, ¶287. With Figure 7, the single haptic output signal would call for the "combined" vibration of S520. With Figure 12, the single haptic output signal would call for vibration 715.

e. [15H]: "outputting, by the haptic output device, a haptic effect in response to the haptic output signal"

Ku discloses [15H]. Welch, ¶288. As Figure 7 expressly states, it illustrates "output[ting] vibration in which vibration signals, each corresponding to the proximity signal and the touch signals, are combined" (S520). Figure 12 illustrates one example in which vibration 715 is generated if and only if proximity and touch signals are detected from the same menu icon. Such vibration constitutes a "haptic effect." As §VII.C.1.d explains, Ku's haptic module 157 generates the actual vibration based on a haptic output signal. Welch, ¶288.

8. Claim 16: "direct a user to contact the touch-sensitive device at a particular location"

Ku's "*haptic output signal*" of method claim 16 is "*designed to direct a user to contact the touch-sensitive device at a particular location*" for the same reasons as the "*haptic output signal*" of device claim 4. See §VII.C.3; see also Welch, ¶289.

9. Claim 19

Claim 19 recites a computer-readable non-transitory medium with program code for executing steps [15A]-[15G] of claim 15.

Claim 19 is obvious over Ku for the same reasons detailed above concerning claim 15, as confirmed by Ku’s teaching that “the invention may be implemented as a computer program product accessible from a computer-usable or computer-readable medium providing program code for use by or in connection with a computer or other instruction execution system.” 19:52-56. Ku discloses many examples of such media that are nontransitory. 19:62-20:4. POSAs would have understood that this teaching applies to the embodiments illustrated in Ku’s above-discussed Figures 7 and 12. Welch, ¶¶290-291.

D. Ground 4: Ku-Jiang Renders Claims 1-6, 14-16, and 19 Obvious

All challenged claims are obvious over Ku in view of Jiang.

1. Jiang (EX1010)

Jiang discloses “a type of EMP [electromechanical polymer]-based sensors [] suitable for use in a haptic response, e.g., in a handheld or mobile device.” EX1010, [0002]; Welch, ¶293. Jiang’s “EMP sensor” includes “a [] set of EMP layers provided between a first electrode and a second electrode forming a capacitor,” while the EMP layers can be “activated by application of a voltage across the first and second electrodes.” EX1010, Claim 1. Jiang’s EMP sensor “may serve as a proximity sensor” as its capacitance changes according to the relative location of a finger to the EMP sensor. *Id.*, [0025]. It can distinguish whether it is being “touched” and at the same time “serve as an EMP actuator, when a voltage is applied

to the EMP layers through the sensing electrode.” *Id.*, FIG.5, [0029]-[0030]. Furthermore, Jiang describes that “transparent EMP devices” can be formed using transparent electrodes, and “formed on top of a graphical display of a mobile device, for example, to form a keyboard that provides data input and haptic feedback at the same time.” *Id.*, FIG. 8, [0035]. In short, the EMP sensor doubles as a haptic output device.

Jiang incorporates by reference the entirety of a co-pending application Ser. No. 13/683,990, published as Ramstein (EX1011), which further details EMP-based sensors and actuators. EX1010, [0023]; Welch, ¶294.

2. The Ku- Jiang Combination (“Ku-Jiang”)

POSAs would have had reason to implement Ku’s touch screen using Jiang’s transparent EMP sensors formed on top of a graphical display. *See* Jiang, FIG. 8. Welch, ¶295.

While Ku’s mobile terminal may include “a plurality of haptic modules 157,” Ku does not detail how such modules are arranged. EX1008, 6:67-7:1.

Jiang, however, discloses such an arrangement and teaches that a traditional “haptics system which typically vibrates the entire electrical device []is often rigid,” which Jiang’s EMP actuator improves upon by “provid[ing] a ‘localized’ haptics feedback”—selectively activating only the actuator under the touch. Jiang, FIG. 5; Ramstein, [0028], Welch, ¶297. This is because Jiang’s EMP sensor “can be made

very small,” such that “tactile feedback in response to touch by a human finger may be localized to an area in the immediate vicinity of the touch stimulus.” Ramstein, [0024]; Welch, ¶297. For example, Jiang uses the same pair of “sensing electrodes” to sense input *and* drive actuation of the EMP sensor—reducing the device’s footprint. Jiang, [0030], FIG. 5; Welch, ¶297.

POSAs would have been motivated to implement localized haptics feedback in Ku’s mobile terminal such that instead of vibrating the entire device, the tactile feedback may be “concentrate[d]” “to a localized zone under the user finger” to “reduce the device’s power requirement,” and to “offer[] a stronger sensation and a finer resolution.” Ramstein, [0024]; Welch, ¶298.

POSAs would have had a reasonable expectation of success in implementing Ku’s touch screen with Jiang’s EMP sensor to serve as actuator. For example, POSAs would understand that Jiang’s EMP sensor is an integrated capacitive sensor ([0025], [0029])—consistent with the function of the integrated sensor that would have been obvious to incorporate in Ku as §VII.C.5 explains. Welch, ¶299. Furthermore, Jiang’s EMP sensor can be caused to “vibrate” based on an “output signal,” Ramstein, [0036], *see also* claim 12 (“activates the second set of EMP layers to provide a vibration as a haptic response”), which POSAs would recognize could be used to implement Ku’s haptic output device implementing Ku’s teachings in Figures 7 and/or 12. Welch, ¶299.

3. Claim 1

a. [1PRE]: “A device comprising:”

If the preamble is limiting, Ku-Jiang’s mobile terminal is a “*device*” as claimed. *Supra*, §VII.D.3.a. Welch, ¶300.

b. [1A]: “a proximity sensor capable of detecting a non-contact interaction with a touch-sensitive device and outputting a first sensor signal;”

As §VII.D.2 explains, Ku-Jiang includes a touch screen with a capacitance-based EMP sensor as Jiang discloses. The EMP sensor is a “*proximity sensor capable of detecting a non-contact interaction with*” the touch screen (“*a touch-sensitive device*”) because the EMC sensor detects a “change in voltage” when a finger moves into the proximity of the sensor and thus also the touch screen of which the sensor is a part. Jiang, [0025] (disclosing function as a “proximity sensor”); Welch, ¶301; *see also* FIGS. 1(c) and 1(d). The EMP sensor outputs the result of the detection as a “change in voltage measured,” which is “*first sensor signal*.” Jiang, [0025]; Welch, ¶301.

c. [1B]: “a touch sensor capable of detecting a touch with the touch-sensitive input device and outputting a second sensor signal”

Ku-Jiang’s EMP sensor constitutes a “*touch sensor capable of detecting a touch with the touch-sensitive input device*” because different “noise amplitudes” are measured from the EMP sensor’s “sensor output signal” based on whether a finger “touched” the EMP sensor (incorporated in the touch-sensitive input device)

deployed as a “key.” Jiang, FIG. 5. [0029]; Welch, ¶302. The “sensor output signal” is a “*second sensor signal*” as claimed. [0029]; Welch, ¶302.

d. [1C]: “a haptic output device configured to receive a haptic output signal and output a haptic effect in response to the haptic output signal; and”

Ku-Jiang’s EMP sensor can be caused to “vibrate” (i.e., “*output a haptic effect*”) in response to receiving an “output signal” (a “*haptic output signal*” as claimed). Ramstein, [0036]; Welch, ¶303. *See also* Jiang claim 12 (“activates the second set of EMP layers to provide a vibration as a haptic response”). The EMP sensor is therefore a “*haptic output device*” as claimed. Welch, ¶303. Furthermore, the EMP sensor is “*configured to receive a haptic output signal and output a haptic output effect in response to the haptic output signal*” for the same reasons detailed in §VII.C concerning Ku’s “haptic module.” Welch, ¶303.

e. [1D]-1[G]

Ku-Jiang includes elements [1D], [1E], [1F], and [1G] for the same reasons detailed in §VII.C concerning Ku. The only difference between Ku and Ku-Jiang is Jiang’s EMP sensor, which doubles as both sensors and the haptic output device (in place of Ku’s “haptic module”). The processor and associated signals are identical. Welch, ¶304.

4. Claim 5: “an integrated sensor comprises the proximity sensor and the touch sensor”

Ku-Jiang includes an “*integrated sensor compris[ing] the proximity sensor and the touch sensor.*” Welch, ¶305. As §§VII.D.3.b-VII.D.3.c explain, Ku-Jiang includes a capacitance-based EMP sensor—a single component serving as both a proximity sensor and a touch sensor. Welch, ¶305.

5. Claim 6: “the integrated sensor further comprises the haptic output device”

Ku-Jiang’s “*integrated sensor further comprises the haptic output device.*” Welch, ¶306. As §VII.D.3.d explains, Ku-Jiang’s EMP sensor comprises a capacitor formed of one or more electromechanical polymer layers between two or more electrodes that serve as a proximity sensor, a touch sensor and an actuator—just like the ’738 patent’s “integrated sensor” featuring a “dual proximity sensor and haptic actuator” in which “non-contact capacitive and contact pressure based sensor are integrated into a smart material haptic actuator 202.” EX1001, 2:3-5, 9:1-4, 9:59-66; Welch, ¶306.

6. Other Challenged Claims

Ku-Jiang meets all other challenged claims’ limitations as shown *supra* §C.

VIII. NO BASIS FOR DISCRETIONARY DENIAL

A. *Fintiv*

Under the Director’s Interim Procedure for Discretionary Denials, the PTAB will not deny institution based on *Fintiv*⁵ if there is compelling evidence of unpatentability, which this Petition provides, thereby concluding the *Fintiv* analysis. *Nokia of Am. Corp. v. TQ Delta, LLC*, IPR2022-00471, Paper 11 at 19-21 (Aug. 18, 2022). Regardless, the *Fintiv* factors also weigh against discretionary denial.

1. Potential for Stay

Petitioner will seek a pre-institution stay, but without “specific evidence” how the court will rule, this factor is neutral. *Sand Revolution II v. Continental Intermodal Group–Trucking*, IPR2019-01393, Paper 24 at 7 (June 16, 2020) (informative).

2. Trial Timing

The Board considers the median time to trial which is 27 months for the Western District of Washington. EX1030, 76; *but see* EX1031 (identifying June 2025 trial-ready date). A trial would thus likely occur in late August 2025, **after** a final written decision would be expected. *Cf. Sony Interactive v. Quantum Imaging*, IPR2023-00954, Paper 11 at 26 (Dec. 11, 2023) (trial four months **before** FWD “weighs **against** discretionary denial”).

⁵ *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (Mar. 20, 2020) (precedential).

Moreover, Petitioner filed this petition with diligence, filing less than four months after receiving Immersion’s list of asserted claims, and over three months before the §315(b) deadline. EX1032; EX1033. Factor 2 thus weighs against denial. *Fintiv*, Paper 11 at 11 (“expeditiously” filed petitions “weigh[] against [denial]”).).

3. Litigation Investment

Other than initial motion practice and preliminary contentions, the parties have invested little in the litigation, weighing against denial. *Samsung Elecs. v. Netlist, Inc.*, IPR2022-00063, Paper 13 at 8 (May 5, 2022) (granting institution where no “claim construction and merits determinations” had occurred).

4. Overlap of Issues

Petitioner’s challenge includes claims 4-5 and 16, which Immersion does not assert in the litigation (EX1032). That a trial here will address claims the district court will not address weighs against denial. *Markforged Inc. v. Continuous Composites, Inc.*, IPR2022-00679, Paper 7 at 32-33 (Oct. 25, 2022).

5. Litigation Defendants

Petitioner is the defendant in district court, which “is far from an unusual circumstance.” *Sand Revolution II*, Paper 24 at 12-13. This factor is neutral.

B. Advanced Bionics

None of the petition’s references were of record during prosecution. And although Ku’s published application was cited (EX1002, 62), it was never applied to reject a claim. Discretionary denial under §325(d) is therefore not proper.

Ground 1—based on Pratt—is unrelated to Ku. When a ground “challenges the patent” using a reference “not previously presented to the Office,...part one of the *Advanced Bionics* framework” is unmet, and §325(d) denial is inappropriate. *Align Tech. v. 3Shape A/S*, IPR2021-01309, Paper 11 at 15 (Feb. 9, 2022).

Even if the Board reached part two of *Advanced Bionics* because Ku’s published application was cited, “specific teachings of [Ku] impact[ing] patentability of the challenged claims” were “misapprehend[ed] or overlook[ed].” *Cellco P’ship v. Huawei Device Co.*, IPR2020-01117, Paper 10 at 12 (Feb. 3, 2021). The “fact that [Ku’s publication] was not the basis of rejection weighs strongly against exercising [the Board’s] discretion to deny institution under 35 U.S.C. § 325(d).” *Id.* at 13.

As detailed above, Ku’s Figure 7 expressly discloses “output[ting] vibration in which vibration signals, each corresponding to the proximity signal and the touch signals, are **combined**.” Figure 12 separately illustrates vibration 715 as the **addition** of 705 (corresponding to touch) and 710 (corresponding to proximity) over the same time frame. By contrast, the Choe reference applied during prosecution describes “outputting effects **sequentially**”; it failed to teach that the touch and proximity signals could be “combined.” EX1002, 1091. The repeated citation of Choe rather than Ku’s published application indicates the Examiner overlooked Ku’s teachings. By contrast, during prosecution of the ’738 patent’s European counterpart,

analogous claims were repeatedly rejected over Ku's European counterpart—
leading applicants to abandon the application. *See* §V.D.

IX. CONCLUSION

The Board should institute IPR and cancel the challenged claims.

Respectfully submitted,
Valve Corp.

Date: 02-16-2024

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WOLF, GREENFIELD & SACKS, P.C.

CERTIFICATE OF SERVICE UNDER 37 C.F.R. § 42.6 (E)(4)

I certify that on February 16, 2024, I will cause a copy of the foregoing document, including any exhibits or appendices filed therewith, to be served via Overnight FedEx at the following correspondence address of record for the patent:

Immersion / Kilpatrick Townsend and Stockton
Mailstop: IP Docketing - 22
1100 Peachtree Street
Suite 2800
Atlanta, GA 30309

Date: February 16, 2024

/MacAulay Rush/
MacAulay Rush
Paralegal
WOLF, GREENFIELD & SACKS, P.C.

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24, the undersigned certifies that the foregoing **Petition for *Inter Partes* Review** contains 13,999 words excluding a table of contents, a table of authorities, Mandatory Notices under § 42.8, a certificate of service or word count, or appendix of exhibits or claim listing. Petitioner has relied on the word count feature of the word processing system used to create this paper in making this certification.

Date: February 16, 2024

/MacAulay Rush/

MacAulay Rush

Paralegal

WOLF, GREENFIELD & SACKS, P.C.

X. CLAIM LISTING

The following claim listing assigns element labels (e.g., [1A], [1B], etc.) to certain claims for ease of reference.

Claim 1
[1PRE] A device comprising:
[1A] a proximity sensor capable of detecting a non-contact interaction with a touch-sensitive device and outputting a first sensor signal;
[1B] a touch sensor capable of detecting a touch with the touch-sensitive input device and outputting a second sensor signal;
[1C] a haptic output device configured to receive a haptic output signal and output a haptic effect in response to the haptic output signal; and
[1D] a processor configured to:
[1E] receive the first sensor signal and the second sensor signal;
[1F] generate a haptic output signal based at least in part on the first and second sensor signals; and
[1G] transmit the haptic output signal to the haptic output device.
Claim 2
The device of claim 1, wherein the proximity sensor is integrated into the touch-sensitive device.
Claim 3
The device of claim 1, wherein the proximity sensor comprises one of a capacitive sensor or an optical sensor.
Claim 4
The device of claim 1, wherein the haptic output signal is designed to direct a user to contact the touch-sensitive device at a particular location.
Claim 5
The device of claim 1, wherein an integrated sensor comprises the proximity sensor and the touch sensor.
Claim 6
The device of claim 5, wherein the integrated sensor further comprises the haptic output device.

Claim 14
[14PRE] The device of claim 1, wherein
[14A] the touch sensor is capable of detecting a pressure and wherein
[14B] the haptic output signal is based at least in part on the detected pressure.
Claim 15
[15PRE] A method comprising:
[15A] detecting, by a proximity sensor, a non-contact interaction with a touch-sensitive device;
[15B] detecting, by a touch sensor, a touch on the touch-sensitive device;
[15C] transmitting a first sensor signal associated with the non-contact interaction to a processor;
[15D] transmitting a second sensor signal associated with the touch to a processor;
[15E] receiving, by the processor, the first and second sensor signals;
[15F] generating, by the processor, a haptic output signal based at least in part on the first and second sensor signals;
[15G] transmitting, by the processor, the haptic output signal to a haptic output device; and
[15H] transmitting, by the processor, the haptic output signal to a haptic output device; and
Claim 16
The method of claim 15, wherein the haptic output signal is designed to direct a user to contact the touch-sensitive device at a particular location.
Claim 19
[19PRE] A computer-readable non-transitory medium encoded with executable program code, the computer-readable medium comprising:
[19A] program code for detecting, by a proximity sensor, a non-contact interaction with a touch-sensitive device;
[19B] program code for detecting, by a touch sensor, a touch on the touch-sensitive device;
[19C] program code for transmitting a first sensor signal associated with the non-contact interaction to a processor;

[19D] program code for transmitting a second sensor signal associated with the touch to a processor;
[19E] program code for receiving, by the processor, the first and second sensor signals;
[19F] program code for generating, by the processor, a haptic output signal based at least in part on the first and second sensor signals;
[19G] program code for transmitting the haptic output signal to a haptic output device