

Petition for *Inter Partes* Review of
U.S. Patent No. 8,896,524 B2

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

META PLATFORMS, INC.,
Petitioner

v.

IMMERSION CORPORATION,
Patent Owner

Case IPR2023-00943
U.S. Patent No. 8,896,524 B2
Issue Date: November 25, 2014

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 8,896,524 B2**

TABLE OF CONTENTS

	Page
I. MANDATORY NOTICES UNDER §42.8(A)(1)	1
A. Real Party-In-Interest Under §42.8(b)(1).....	1
B. Related Matters Under §42.8(b)(2)	1
C. Lead and Back-Up Counsel under §42.8(b)(3)	1
D. Service Information	2
E. Power of Attorney	2
II. FEE PAYMENT	3
III. REQUIREMENTS UNDER §§ 42.104 AND 42.108 AND CONSIDERATIONS UNDER §§ 314(A) AND 325(D).....	3
A. Standing.....	3
B. Identification of Challenge.....	3
C. §§314(a) and 325(d)	3
IV. OVERVIEW OF THE '524 PATENT	4
A. Level of Ordinary Skill in the Art	4
B. Specification Overview	5
V. CLAIM CONSTRUCTION	6
VI. THE CHALLENGED CLAIMS ARE UNPATENTABLE.....	7
A. Overview of the Grounds of Unpatentability.....	7
B. Ground 1: Claims 1-2, 6-8, 11-14 Are Obvious Over Poupyrev in View of Yun.	8
1. Independent Claim 1	8
(a) “receiving context metadata associated with a user interaction of a user interface element, wherein the context metadata comprises at least one of: data indicating a functionality of the user interface element, or data indicating a history of the user interface element;” (Limitation 1[a]).....	18
(b) “mapping the received context metadata to one or more haptic parameters;” (Limitation 1[b])	29

TABLE OF CONTENTS
(continued)

	Page
(c) “generating a haptic signal based at least in part on the one or more haptic parameters; and” (Limitation 1[c])	37
(d) “sending the haptic signal to an actuator to generate the confirmation haptic effect.” (Limitation 1[d])	37
2. Claim 2: “The non-transitory computer-readable medium of claim 1, further comprising modifying the one or more haptic parameters based on user input.”	39
3. Claim 6: “The non-transitory computer-readable medium of claim 1, wherein the context metadata further comprises at least one of: data indicating one or more physical properties of the user interface element, or sensor input data.”	43
4. Claim 7: “The non-transitory computer-readable medium of claim 1, wherein the one or more haptic parameters comprises at least one of: a magnitude haptic parameter, a frequency haptic parameter, a duration haptic parameter, an amplitude haptic parameter, or a waveform haptic parameter.”	44
5. Claim 8: “The non-transitory computer-readable medium of claim 1, wherein the user interface element comprises at least one of: a physical element of a device or a virtual element of a device.”	45
6. Claims 11-14	46
C. Ground 2: Claims 2-4 and 12 Are Obvious Over Poupyrev and Yun in View of Braun and Rosenberg.	46
1. Claim 2: “The non-transitory computer-readable medium of claim 1, further comprising modifying the one or more haptic parameters based on user input.”	47

TABLE OF CONTENTS

(continued)

	Page
2. Claim 3: “The non-transitory computer-readable medium of claim 2, wherein the user input comprises one or more multipliers defined by the user; and wherein each value included for each of the one or more haptic parameters is based on the one or more multipliers.”	54
3. Claim 4: “The non-transitory computer-readable medium of claim 3, wherein the one or more multipliers are globally defined for all user interface elements.”	55
4. Claim 12: “The computer-implemented method of claim 11, further comprising modifying the one or more haptic parameters based on user input.”	57
VII. CONCLUSION.....	57
CERTIFICATE OF SERVICE	59

Petition for *Inter Partes* Review of
U.S. Patent No. 8,896,524 B2

List of Exhibits

Exhibit No.	Description of Document
1001	U.S. Patent No. 8,896,524 B2 to David M. Birnbaum et al. (filed August 24, 2012 and issued November 25, 2014) (“ 524 ” or “ 524 patent ”)
1002	Declaration of Jeremy Cooperstock, Ph.D. (“ Cooperstock ”)
1003	U.S. Patent No. 7,952,566 B2 to Ivan Poupyrev et al. (filed July 31, 2007, issued May 31, 2011) (“ Poupyrev ”)
1004	U.S. Patent Application Publication No. 2009/0322498 A1 to Jue Byung Yun et al. (filed May 5, 2009, published December 31, 2009) (“ Yun ”)
1005	U.S. Patent No. 6,300,936 B1 to Adam C. Braun et al. (filed November 14, 1997, issued October 9, 2001) (“ Braun ”)
1006	U.S. Patent No. 6,169,540 B1 to Louis B. Rosenberg et al. (filed June 17, 1997, issued January 2, 2001) (“ Rosenberg ”)
1007	Excerpts from <i>Microsoft Computer Dictionary</i> (5th ed. 2002)
1008	Joint Claim Construction Statement filed in <i>Immersion Corp. v. Meta Platforms, Inc.</i> , No. 6:22-cv-00541-ADA (filed January 21, 2023)
1009	Prosecution history of the ’524 patent
1010	Affidavit of Service, ECF No. 6, dated June, 2, 2002, filed in <i>Immersion Corp. v. Meta Platforms, Inc.</i> , No. 6:22-cv-00541-ADA (W.D. Tex.)

Petition for *Inter Partes* Review of
U.S. Patent No. 8,896,524 B2

I. MANDATORY NOTICES UNDER §42.8(A)(1)

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

Meta Platforms, Inc. is the real party-in-interest to this IPR petition.

B. Related Matters Under §42.8(b)(2)

The '524 patent is the subject of the following pending litigation involving
Petitioner: *Immersion Corp. v. Meta Platforms, Inc.*, No. 6:22-cv-00541-ADA
(W.D. Tex.). Petitioner was served with the Complaint in that action on May 27,
2022. (See EX1010, p.001.)

C. Lead and Back-Up Counsel under §42.8(b)(3)

Petitioner provides the following designation of counsel.

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Petition for *Inter Partes* Review of
U.S. Patent No. 8,896,524 B2

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D. Service Information

This Petition is being served by Federal Express to the attorneys of record for the '524 patent, 99292 - Medler Ferro Woodhouse & Mills/Immersion, 8201 Greensboro Drive, Suite 1060, McLean, VA 22102.

This Petition is also being served on litigation counsel identified in the Certificate of Service. Petitioner consents to electronic service at the addresses provided above for lead and back-up counsel.

E. Power of Attorney

Filed concurrently per 37 C.F.R. § 42.10(b).

Petition for *Inter Partes* Review of
U.S. Patent No. 8,896,524 B2

II. FEE PAYMENT

Petitioner requests review of eleven (11) claims, with a \$41,500 payment.

III. REQUIREMENTS UNDER §§ 42.104 AND 42.108 AND CONSIDERATIONS UNDER §§ 314(A) AND 325(D)

A. Standing

Petitioner certifies that the '524 patent is available for IPR and that Petitioner is not barred or otherwise estopped.

B. Identification of Challenge

Petitioner requests institution of IPR based on the following grounds:

Ground	Claims	Basis under §103
1	1-2, 6-8, 11-14	Poupyrev, Yun
2	2-4, 12	Poupyrev, Yun, Braun, Rosenberg

Submitted herewith is a Declaration of Jeremy Cooperstock, Ph.D. (EX1002) (“Cooperstock”), a qualified technical expert. (Cooperstock, ¶¶1-7, Ex. A.)

C. §§314(a) and 325(d)

Petitioner does not believe any basis exists under either §314(a) or §325(d) for discretionary denial of this Petition. Petitioner reserves its right to respond to any discretionary denial arguments later presented by Patent Owner.

With respect to §314(a), Petitioner has not previously filed an IPR petition against the '524 patent, and is unaware of any other prior IPR petition against the

Petition for *Inter Partes* Review of
U.S. Patent No. 8,896,524 B2

'524 patent. In the pending litigation, the district court has continued the claim construction hearing several times, and as of the filing of this Petition, no claim construction or other substantive rulings have issued. A trial date has been set for February 20, 2024, but Petitioner has filed a motion to transfer the case to the Northern District of California (which remains pending as of the filing of this Petition). In the event of IPR institution, moreover, Petitioner intends to file a motion to stay the litigation pending the outcome of the IPR. In order to address any concerns regarding duplication of efforts, Petitioner hereby provides a *Sotera* stipulation that, in the event of IPR institution, Petitioner will not pursue in the district court any grounds of invalidity against the challenged claims that were raised or reasonably could have been raised in IPR.

With respect to §325(d), none of the prior art cited in any of the grounds identified in **Part III.B** above was previously presented during prosecution of the '524 patent. Petitioner notes that Braun (EX1005) and Rosenberg (EX1006) are earlier patents that originated from Patent Owner, but neither of them is referenced anywhere in the '524 patent written description nor was cited or considered during prosecution of the '524 patent.

IV. OVERVIEW OF THE '524 PATENT

A. Level of Ordinary Skill in the Art

A person of ordinary skill in the art would have possessed a bachelor's degree

in electrical engineering or computer science (or an equivalent degree), and two years of practical or industry experience in the field of human computer interaction, including implementation of computer-based systems and software for providing haptic feedback effects to a user. (Cooperstock, ¶¶12-13.) A person could also have qualified with more formal education and less practical or industry experience, or vice versa. (*Id.*)

B. Specification Overview

The '524 patent discloses a system that produces a “confirmation haptic effect” in response to a user interaction with a user interface element. ('524, Abstract.) The Background explains that “[h]aptics is a tactile and force feedback technology that takes advantage of a user’s sense of touch by applying haptic feedback effects (i.e., ‘haptic effects’), such as forces, vibrations, and motions, to the user.” ('524, 1:11-14.) The patent also acknowledges the existence of prior art devices that could generate confirmation haptic effects. ('524, 1:14-26.)

In one embodiment, the '524 patent discloses a confirmation haptic effect being produced “in response to an interaction with a user interface element of a device, such as a button displayed within a touchscreen or a keyboard, where the confirmation haptic effect can be customized based on context metadata, or some other metadata, associated with the interaction of the user interface element.” ('524,

1:59-65.) With respect to this “**context metadata**,” the patent explains that it “can include data indicating one or more physical properties of the user interface element, such as the size or shape of the user interface element,” and can also include “indicating functionality of the user interface element.” (’524, 1:65-2:3.) “Context metadata can also include data indicating a history of interaction with the user interface element.” (’524, 2:6-8.) The context metadata is then used to customize the haptic effect provided to the user. “The customization of the confirmation haptic effect can be a modification of one or more haptic parameters, such as, but not limited to, magnitude, duration, frequency, and waveform.” (’524, 2:17-20.)

V. CLAIM CONSTRUCTION

No claim construction rulings have issued in the pending litigation. Proposed constructions have been exchanged between Petitioner and Patent Owner for certain claim terms, *i.e.*, “**confirmation haptic effect**,” “**context metadata**,” and “**haptic parameter**.” (EX1008, p.002.) Petitioner does not believe any of these terms requires express construction for purposes of IPR because, as demonstrated below, the claims are obvious under any of the constructions proposed in the pending litigation, or under any other reasonable construction. Petitioner reserves its right to respond to any claim construction arguments later presented by Patent Owner.

VI. THE CHALLENGED CLAIMS ARE UNPATENTABLE.

A. Overview of the Grounds of Unpatentability

The '524 patent attempts to lay claim to well-known techniques of producing haptic effects or tactile feedback in response to a user's interaction with a graphical user interface element, such as a button on a touch screen display. These techniques are disclosed by **Poupyrev** (EX1003), an analogous reference in the same field of devices that produce haptic effects. (Cooperstock, ¶87.) Poupyrev discloses techniques for generating haptic effects (such as vibrations) in response to user actions, such as pressing a graphical user interface element (*e.g.* button) on a touch-screen display device. (Poupyrev, *e.g.*, Abstract, 1:9-11, 4:66-5:7, Fig. 5; Cooperstock, ¶¶42-47, 66-67.) The haptic effects provided to the user can be based on, among other things, the amount of pressure applied by the user and the history of the user interface element (*e.g.* button) with which the user is interacting. (Poupyrev, *e.g.*, 5:11-22, 2:8-14, 2:22-33; Cooperstock, ¶¶43, 80.)

Poupyrev is a strong prior art reference that discloses and renders obvious the majority of the limitations of the challenged claims. **Ground 1** combines Poupyrev with **Yun** (EX1004) as a second independent and alternative basis for disclosing the “**context metadata**” limitation of claim 1, as discussed in **Part VI.B.1(a)** below.

Ground 2 addresses dependent claims 2-4 and 12, which relate to modifying haptic parameters based on user input. These additional limitations add nothing of

patentable significance and are rendered obvious in further view of **Braun** (EX1005) and **Rosenberg** (EX1006), as explained fully in **Part VI.C** below.

Poupyrev, Yun, Braun and Rosenberg all qualify as prior art to the '524 patent under at least 35 U.S.C. § 102(b) (pre-AIA) because they are patents or patent applications that issued and/or published more than one year before the August 24, 2012 filing date of the application for the '524 patent.

B. Ground 1: Claims 1-2, 6-8, 11-14 Are Obvious Over Poupyrev in View of Yun.

1. Independent Claim 1

The preamble recites “[a] **non-transitory computer-readable medium having instructions stored thereon that, when executed by a processor, cause the processor to generate a confirmation haptic effect, the generating the confirmation haptic effect comprising....**” Assuming the preamble is limiting, it is disclosed by and rendered obvious over Poupyrev.

Poupyrev discloses a technique for generating “**a confirmation haptic effect,**” which takes the form of tactile feedback provided to a user through a touch screen display of a device. (Cooperstock, ¶¶65-68.) As explained in more detail below, this confirmation haptic effect is generated as a result of software instructions executed by a processor. (Cooperstock, ¶73.)

Figure 1 shows an exemplary apparatus **1** for implementing the techniques

disclosed in Poupyrev:

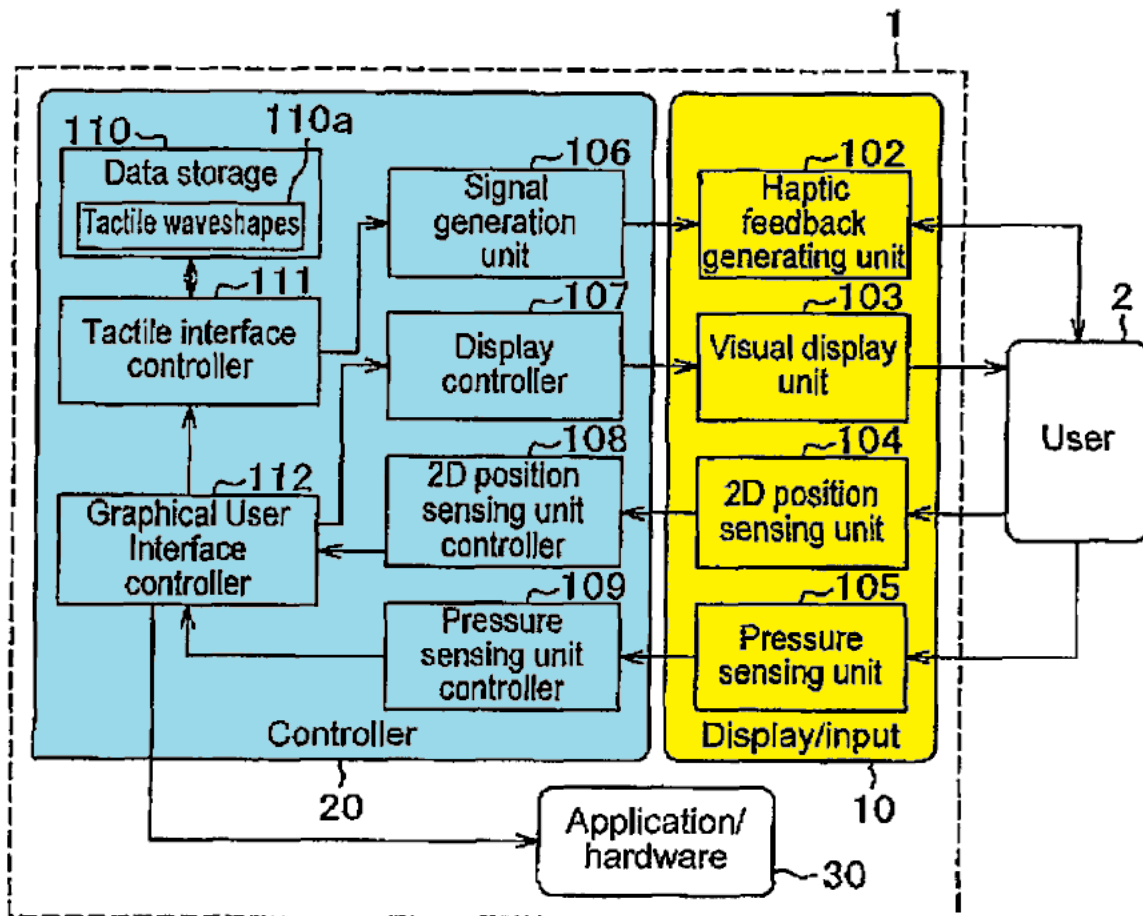


Figure 1

(Poupyrev, Fig. 1 (highlighting added), 2:1:61-65.) Apparatus 1 shown above contains two key portions, **display/input section 10** and **controller section 20**.

Display/input section 10 as shown includes visual display unit 103, which “presents visual information to the user 2.” (Poupyrev, 5:27-28.) “Such visual information may include various predefined GUI objects that user can interact with, such as images of buttons, sliders, drawing, scroll bars, hyper links and etc.”

(Poupyrev, 5:28-31; *see also id.*, 4:66-5:2.) As explained in more detail below, **display/input section 10** includes a 2D position sensing unit **104** which, as its name implies, “detects where the user is touching on the touch screen.” (Poupyrev, 6:3-4.)¹ And **display/input section 10** also includes pressure sensing unit **105** that, as its name also implies, is used “to measure pressure applied to the touch screen by the user’s input operation.” (Poupyrev, 5:46-47.) **Display/input section 10** detects when the user has touched the screen, and in response, and “provides different types of tactile feedback in response to the user’s input operation.” (Poupyrev, 4:66-5:7, 8:6-8 (“It is desirable to provide different levels of the tactile feedback with a GUI object depending on the pressure applied on the GUI object.”).)

The “**haptic effect**” in Poupyrev thus takes the form of tactile feedback provided to the user in response to interacting with a GUI object, such as a button displayed on a touch screen display device. Although Poupyrev sometimes uses the word “tactile” when referring to haptic effects, Poupyrev makes clear that it treats

¹ Poupyrev sometimes mixes up the numerals (**104**, **105**) used to refer to the position sensing unit and pressure sensing unit of Figure 1. (*Compare* Poupyrev, 5:24-25 (“...position sensing unit **104** and a pressure sensing unit **105**.”), 5:46-47 (“... pressure sensing unit **104**”), 6:4-5 (“... position sensing unit **105**....”).) For consistency, Petitioner will refer to “position sensing unit” as **104** and pressure sensing unit” as **105**, consistent with Figure 1. An ordinarily skilled artisan would have regarded these inconsistencies as immaterial typographical errors that would not have impeded an ordinarily skilled artisan’s ability to fully understand and apply the teachings of Poupyrev. (Cooperstock, ¶¶44 n.1, 76 n.2.)

“tactile” and “haptic” as synonyms. (Poupyrev, 5:8-10 (“It should be noted, in this specification, that the word ‘tactile’ and ‘haptic’ indicate the same sensory effect and are used interchangeably.”).)

The haptic effect in Poupyrev also qualifies as “a **confirmation haptic effect**” because it occurs in response to user interaction with a GUI object and confirms the user interaction with the GUI object. (Poupyrev, 6:14-19.) Figure 5 shows an example of confirmation haptic events:

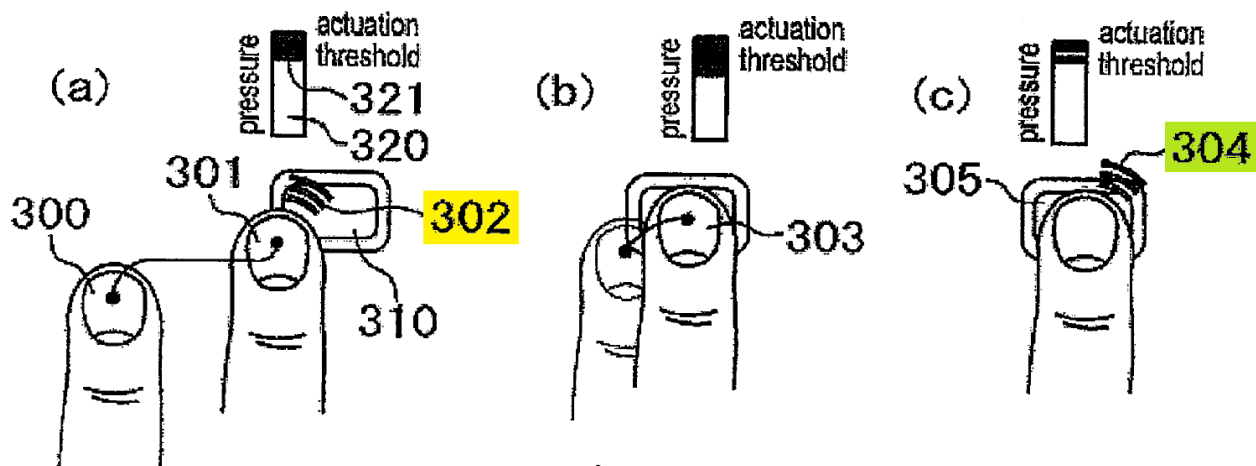


Figure 5

(Poupyrev, Fig. 5 (highlighting added).) Figure 5 above shows two different haptic feedbacks (**302** and **304**) being provided to the user.

Starting with Figure 5(a), the user has slid their finger from initial position **300** to position **301** at the boundary of GUI object **310**. (Poupyrev, 8:56-67.) The apparatus “provides a tactile feedback **302** to allow the user 2 to ‘feel’ the GUI object **310**.” (Poupyrev, 8:63-67.) The user has at this stage selected but not yet activated (actuated) the GUI object. (Poupyrev, 8:41-42 (“Accordingly, the user 2 can feel

the GUI objects on the screen without activating them”).)

Figure 5(b) shows that the user has subsequently moved their finger further inside GUI object **310** and increased the pressure (*i.e.*, how strong it is pressing down on the screen) to a level above actuation threshold **321**. (Poupyrev, 9:4-12.) This indicates that “the GUI object **310** is actuated,” and in response as shown in Figure 5(c), “tactile feedback **304** is provided as well as visual feedback **305** to inform the user **2** that the GUI object **310** was selected and actuated.” (Poupyrev, 9:6-11; *see also id.*, 8:47-49.) Different haptic feedback effects can be provided for the “selected” and “activated” states of the GUI object. (Poupyrev, 8:50-52.)

Tactile feedback **302** and **304** both separately and independently disclose a “**confirmation haptic effect**” because each of them confirms that the user has either selected a GUI object (**302**), or has successfully activated (actuated) the GUI object (**304**). (Poupyrev, 8:12-19; Cooperstock, ¶67.) Each of these haptic effects mirrors the description of confirmation haptic effects in the ’524 patent, which describes a “**confirmation haptic effect**” as a haptic effect that indicates that the user has successfully interacted with the device. (’524, 1:14-18.)

Petitioner notes that the ’524 patent does not require that a “**confirmation haptic effect**,” as applied to Poupyrev, be limited only to the haptic effect occurring when the user actually activates (actuates) a user interface element – both the

selection 302 and actuation 304 haptic effects above confirm the user's interaction with the GUI object. (Cooperstock, ¶68.) But even if “**confirmation haptic effect**” as applied to Poupyrev was limited to the user actually activating the user interface element, tactile feedback 304 occurs when the user interface element is actually activated, as explained. (Cooperstock, ¶68.)

And even if Patent Owner were to argue that neither the selection 302 nor actuation 304 haptic effects qualifies as “**a confirmation haptic effect**,” Poupyrev discloses a further embodiment expressly described as providing tactile feedback for “confirmation” purposes. In this embodiment, as Poupyrev explains, “an additional step for confirming the completion of actuating operation, such as adding another pressure threshold or detecting releasing of the finger, may be added to avoid accidental actuation.” (Poupyrev, 9:13-16.)² This is depicted in Figure 11:

² All underlining in quotations from the prior art references was added for emphasis.

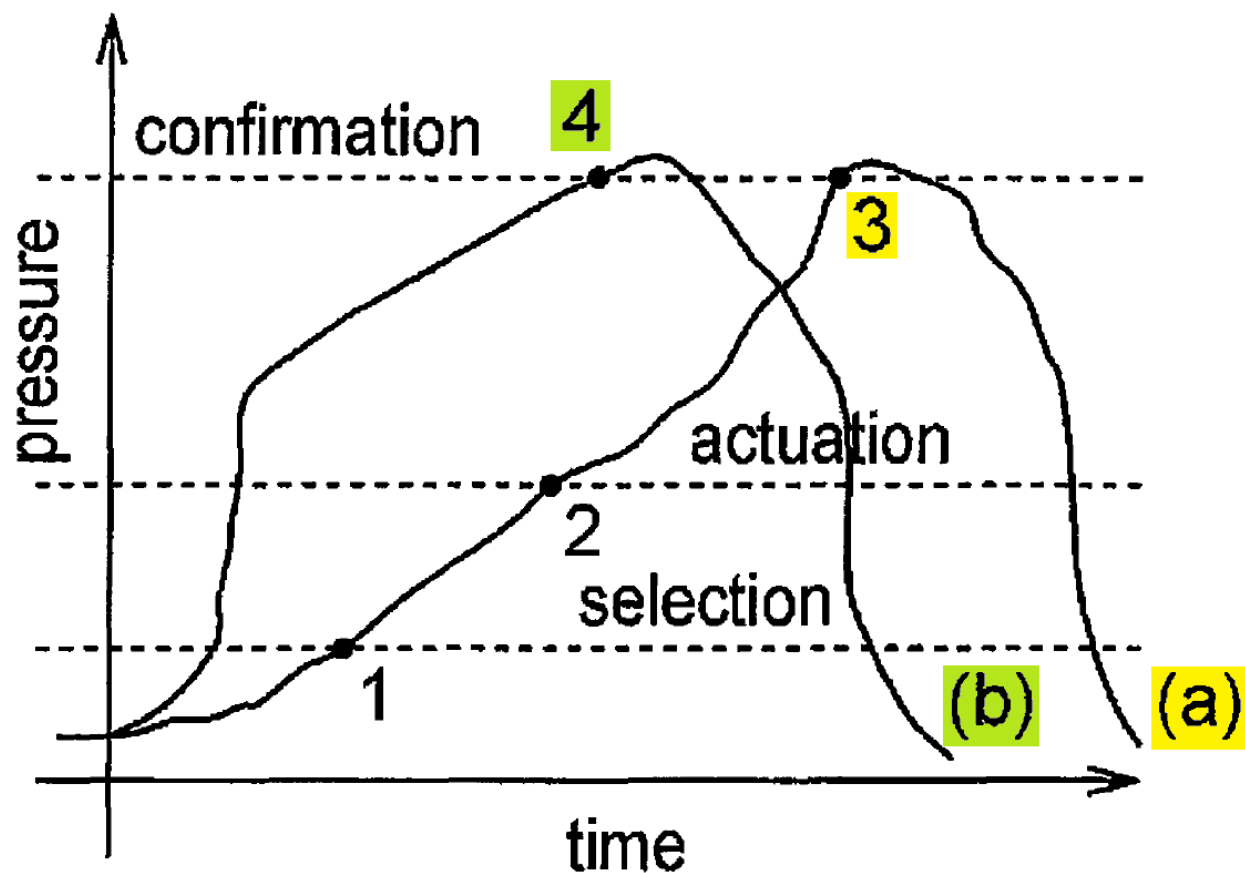


Figure 11

(Poupyrev, Fig. 11 (highlighting added).) Figure 11 shows two exemplary pressure curves (a) and (b), each showing tactile feedback provided to a user based on the pressure applied to a GUI object over time. The user has in both examples touched and pressed on a GUI object and then increased the amount of pressure.

For Curve (a), at Point 1 the user has passed the “selection” pressure threshold causing tactile feedback to be provided – but the GUI object is not yet actuated. (Poupyrev, 12:30-34.) “The user presses further to pass the actuation threshold where a different tactile feedback is provided (Point 2). In this example, however,

the GUI object is not actuated yet. To actuate the GUI object, the user should press further to the confirmation threshold that also provides still another tactile feedback (Point 3).” (Poupyrev, 12:34-37.) Point 3 thus discloses “**a confirmation haptic effect**” under the narrowest understanding of that term, because the haptic effect provided at Point 3 confirms that the user has successfully activated the GUI object. (Cooperstock, ¶67.) Poupyrev explains that “the reason for providing this additional threshold or confirmation threshold is to avoid accidental activation of the GUI objects.” (Poupyrev, 12:38-40.)

Curve (b) differs from Curve (a) because, as shown, the user has pressed on the GUI object resulting in only tactile feedback at Point 4, the confirmation level. (Poupyrev, 12:49-53.) This is because the user increased the pressure rapidly and thus did not press long enough at lower pressure levels to trigger the selection and actuation thresholds shown in Curve (a). Point 4 nevertheless provides yet another example of a “**confirmation haptic effect**,” under a narrow interpretation, because it confirms that the user has activated the GUI object. (Cooperstock, ¶68.)

Poupyrev satisfies all of the constructions of “**confirmation haptic effect**” provided in the pending litigation. Petitioner proposed that “**confirmation haptic effect**” be construed as “*a haptic effect used to confirm the interaction with the user interface element.*” (EX1008, p.002.) Poupyrev discloses such a haptic effect, as

explained, because the tactile feedback delivered to the user is used to confirm that the user has selected or activated (actuated) a GUI object. In either case, the feedback confirms user interaction with the GUI object. (Cooperstock, ¶71.)

Patent Owner has proposed that “**confirmation haptic effect**” be given its plain and ordinary meaning, but to the extent any construction is necessary, has proposed the following definition: “*one of multiple possible tactile feedback events for a single user interface element, customized based on context metadata, to confirm the interaction with the user interface element.*” (EX1008, p.002.) This construction imports additional limitations not appearing in the claim nor required by the written description, including (1) redefining “**haptic effect**” to “tactile feedback event” and (2) requiring that “a single user interface element” have “multiple possible tactile feedback events.” But these unwarranted limitations, even if required by the claimed “**confirmation haptic effect**,” are met by the prior art.

With respect to (1), as noted, Poupyrev itself makes clear that it treats “haptic” and “tactile” feedback as synonyms. (Poupyrev, 5:9-11 (“It should be noted, in this specification, that the word ‘tactile’ and ‘haptic’ indicate the same sensory effect and are used interchangeably.”).) With respect to (2), Poupyrev discloses that a single GUI object can have multiple possible tactile feedback events. In the embodiment above relating to Curve (a) of Figure 11 of Poupyrev, for example, a single GUI

object delivers at least three different types of haptic feedback in response to three different events, *i.e.*, the user pressing on the GUI object and then passing the selection (Point 1), actuation (Point 2) and confirmation (Point 3) thresholds. (Cooperstock, ¶¶69, 72.) And as will be explained fully for limitations 1[a]-1[b] below, it would have been obvious based on Poupyrev alone or in view of Yun that confirmation haptic effects are “*customized based on context metadata*,” as proposed by Patent Owner. (Cooperstock, ¶¶72, 92-96.)

Finally, Poupyrev also discloses and renders obvious “[a] **non-transitory computer-readable medium having instructions stored thereon that, when executed by a processor, cause the processor to generate a confirmation haptic effect**,” as recited in the preamble. Poupyrev also explains that **control section 20** shown in Figure 1 above “may be embodied with a computer... which may include a CPU [*i.e.*, central processing unit], a memory, an external data storage, and an input/output interface.” (Poupyrev, 6:23-26; *see also id.*, 7:34-36 (discussing that data storage 110, within control section 20, may be “[a]ny widely available data storage devices,” including “flash memory, ROM, hard drive as well as network storage.”).) Poupyrev further discloses that “[v]arious functions performed by sub-sections of the control section 20 and the application section 30 may be realized by executing corresponding software installed in the computer...” (Poupyrev, 6:26-

29.) It would have been obvious that the software executed in Poupyrev would have taken the form of instructions, which would have been stored in a non-transitory data storage device in order to allow the CPU to retrieve and execute them. (Cooperstock, ¶73.) Poupyrev therefore discloses and renders obvious a computer memory such as network storage, flash memory, hard drive, etc. (“**non-transitory computer-readable medium**”) having software instructions that, when executed by the CPU, cause the CPU to generate a confirmation haptic effect and perform each of the functions of claim 1 as described below. (*Id.*)

- (a) “**receiving context metadata associated with a user interaction of a user interface element, wherein the context metadata comprises at least one of: data indicating a functionality of the user interface element, or data indicating a history of the user interface element;**” (Limitation 1[a])

For purposes of limitation 1[a], “**a user interface element**” in Poupyrev corresponds to a graphical user interface (GUI) object displayed to the user on a touch screen device. As explained for the preamble above, Poupyrev explains that “[t]he display/input section **10** displays on a touch screen thereof images of buttons, keys, switches or any other Graphic User Interface (GUI) objects to prompt a user **2** to interact with the apparatus **1**.” (Poupyrev, 4:66-5:2; *see also id.*, 5:28-31.)

The claimed “**user interaction**” for limitation 1[a] occurs when a user in Poupyrev interacts with a GUI object, such as by making contact using a finger or

pointing device. (Poupyrev, 1:67-2:1, 6:61-67.) Poupyrev explains that “[t]he interaction starts when the user **2** touches the screen (touch down event T1). The user **2** can then either drag a finger across the input space (drag or slide state T2) or hold it steady in one place (hold state T3).” (Poupyrev, 7:48-51.) For example, in the case of a button GUI object, the claimed “**user interaction**” corresponds to the user touching and holding an area of the screen associated with the button object.

The “**context metadata**” in Poupyrev takes the form of data about the user’s interaction with the GUI object, which includes at least information about **(1)** the *position* on the screen where the interaction is occurring, and **(2)** the *amount* of pressure applied by the user. (Cooperstock, ¶¶76-77.) Figure 1 depicts that both of these pieces of information are received by at least controller **20**:

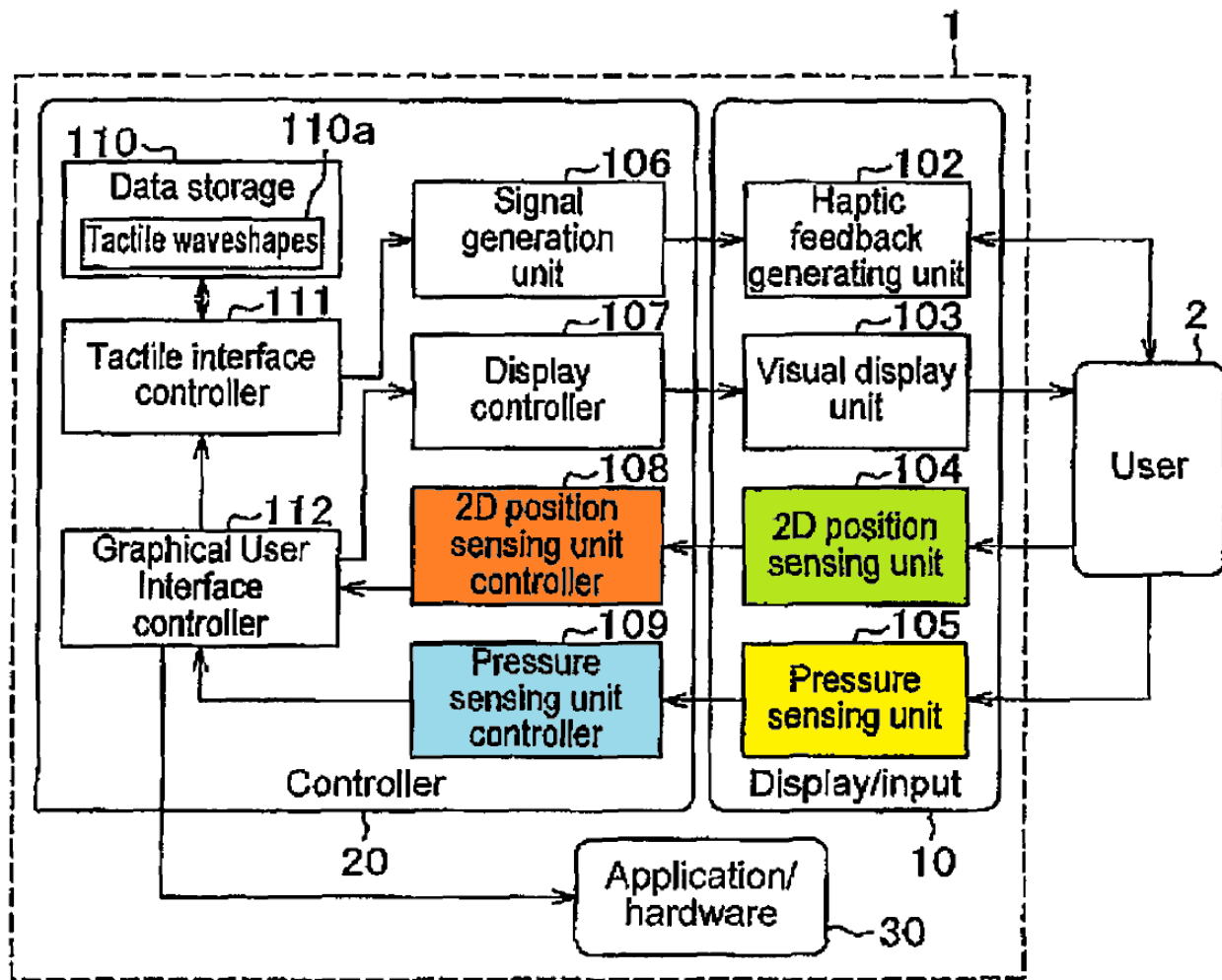


Figure 1

(Poupyrev, Fig. 1 (highlighting added).) Figure 1 shows position sensing unit 104, part of display/input section 10, which “detects where the user is touching on the touch screen.” (Poupyrev, 6:3-4.) Sensing unit 104 feeds into position sensing unit controller 108, part of controller 20, which “determines the position where the user 2 is touching on the screen.” (Poupyrev, 7:3-4.) Figure 1 also shows pressure sensing unit 105, part of the display/input section 10, that “measure[s] pressure applied to the touch screen by the user’s input operation.” (Poupyrev, 5:46-47, 5:33-

34 (identifying “pressure sensing unit **105**” as being used with visual display unit **103**.) Pressure sensing unit **105** in turn feeds into pressure sensing unit controller **109**, which “determines the value of pressure applied when the user is touching on the screen.” (Poupyrev, 7:1-3.)

As also shown in Figure 1, position and pressure data are received by GUI controller **112**, which is part of control section **20**. (Poupyrev, 7:4-5 (“The determined data [from the position and pressure sensing controllers] is communicated to the GUI controller **112**.”).) It therefore would have been obvious that the “**context metadata**” in Poupyrev, which includes information about position and pressure, would have been “**receiv[ed]**” by at least control section **20** of Figure 1. (Cooperstock, ¶76.) As explained below for limitation 1[b], controller **20** uses the detected position and pressure to determine the particular haptic feedback to be provided to the user. (Poupyrev, *e.g.*, 2:10-14.)

In the pending litigation, Petitioner has proposed that “**context metadata**” be defined as “*any data associated with an interaction with the user interface element,*” while Patent Owner has argued that this term should be given its plain and ordinary meaning and thus proposed no construction. (EX1008, p.002.) Petitioner’s proposed construction is satisfied by at least the position and pressure data in Poupyrev, individually and/or collectively, because it comprises data associated with

the user's interaction with the GUI object. (Cooperstock, ¶77.) This is also consistent with the written description of the '524 patent which explains that the claimed "**context metadata**" can include "sensor input data, such as a detected force produced by a touch applied to the user interface element by the user." ('524, 2:15-17; *see also id.*, 5:35-38.) The information about position and pressure in Poupyrev mirrors the examples of context metadata in the '524 patent. This is also consistent with dependent claim 6, addressed in **Part VI.B.3** below, which recites that the context metadata may comprise "**sensor input data.**" ('524, 12:8-11 (Claim 6).)

Limitation 1[a] further specifies that the "**context metadata**" comprises either "**data indicating a functionality of the user interface element,**" or "**data indicating a history of the user interface element.**" Although limitation 1[a] requires only one of these categories, the proposed combination covers both, each providing further data about the user's interaction with the user interface element.

Starting with data indicating a history of the user interface element, Poupyrev discloses and renders obvious that the context metadata received by the controller also includes – in addition to position and pressure information – information indicating a history of the GUI object ("**the user interface element**"), which the controller uses to determine the tactile feedback to be provided to the user. (Poupyrev, 7:39-42 ("In another embodiment of the present invention, a history of

the previous input and a history of the previous states of the GUI objects is used to determine the tactile feedback to the user 2.”.) This history includes prior touch positions and pressure values associated with the GUI object, which is in turn used to determine the logical state of the GUI object:

The controller section determines a current logical state of the graphical user interface object using a history of detected touch positions and a history of detected pressure values. The controller section determines a form of the haptic feedback to be generated depending on (i) the detected touch position, (ii) the detected pressure value and (iii) the determined current logical state of the graphical user interface object.

(Poupyrev, 2:8-14; *see also id.*, 2:22-33.) The “**context metadata**” received in Poupyrev therefore also includes “**data indicating a history of the user interface element,**” which can include history of previous states of the GUI object and/or history of prior touch positions and pressure values associated with the GUI object. It would have been obvious that this data would have been “**receiv[ed]**” by at least controller **20** and/or GUI controller **112** in Poupyrev, because it is used by the controller to determine the appropriate tactile feedback to provide to the user as indicated above. (Poupyrev, 2:8-14, 7:29-34, 7:39-42; Cooperstock, ¶80.)

Limitation 1[a] also allows the context metadata to include “**data indicating a functionality of the user interface element.**” As noted, limitation 1[a] only requires context metadata comprising data indicating either history or functionality,

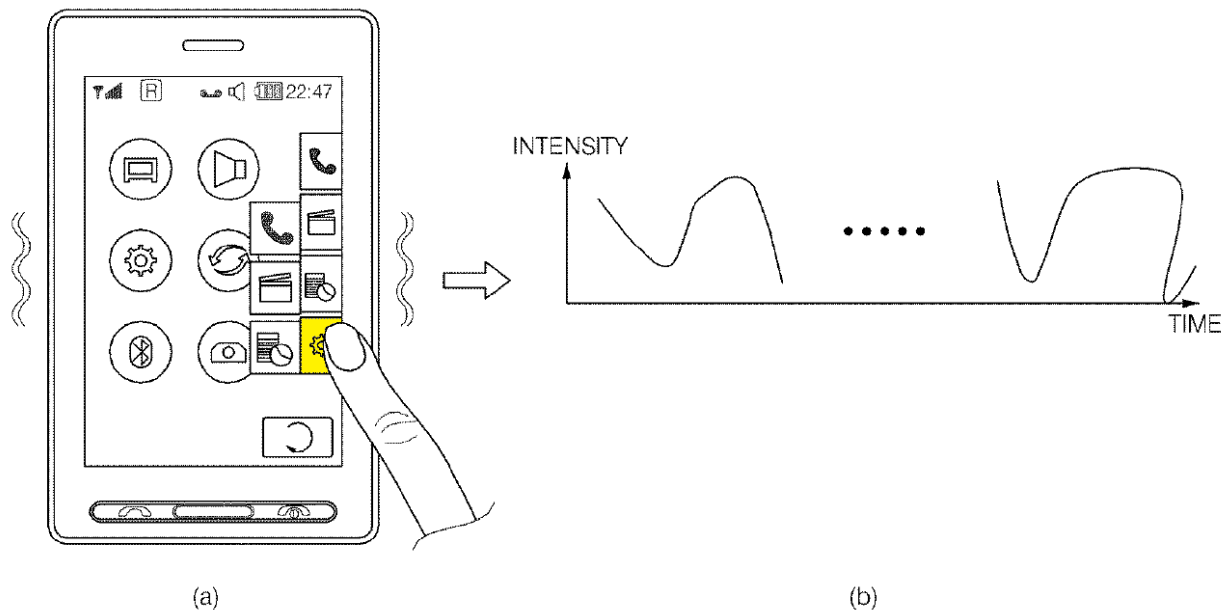
and as such, the history data in Poupyrev alone is sufficient. But in the event Patent Owner argues that Poupyrev's showing on this point is deficient, it would have been obvious in further view of Yun, for the context metadata received by the controller in Poupyrev would also have included (in addition to position and pressure information) "**data indicating a functionality of the user interface element.**"

Yun discloses a technique similar to Poupyrev for providing haptic feedback to a user of a mobile terminal. (Yun, Abstract, ¶0002; Cooperstock, ¶¶49-50.) Yun explains that a mobile terminal can include "a mobile phone, a smart phone, a laptop book computer, a digital broadcast receiver, a personal digital assistant (PDA), a portable multimedia player (PMP), or a navigation device." (Yun, ¶0029.) The mobile terminal includes a number of components including, just like Poupyrev, a touch screen for accepting user input. (Yun, ¶0035.)

The mobile terminal in Yun also includes haptic module 157 that "may provide various haptic effects (such as vibrations) that can be perceived by the user. If the haptic module 157 generates vibration as a haptic effect, the intensity and the pattern of vibration generated by the haptic module 157 may be altered in various manners." (Yun, ¶0042.) Yun discloses numerous examples in which the mobile terminal can provide different haptic feedback (*e.g.*, different vibration intensities and patterns) based on the particular action the user is taking. Figure 36 depicts one

such example in which the mobile terminal generates a haptic effect in response to the user selecting a particular menu icon:

FIG. 36



(Yun, Fig. 36 (highlighting added).)

The left portion (a) of Figure 36 above shows a screen image on a mobile terminal “including a plurality of menu icons.” (Yun, ¶0109.) “In order to enter a menu corresponding to the chosen menu icon,” Yun explains, “the chosen menu icon may be touched. In this case, a haptic effect corresponding to the menu may be generated.” (Yun, ¶0110.) “In this manner, it is possible to generate different haptic effects for different menu items. Thus, it is possible for a user to easily determine which of the menu items has been touched or approached by using the sense of touch.” (Yun, ¶0079, Fig. 9.)

A key feature of Yun, for purposes of the “**context metadata**” limitation, is that the terminal device uses information indicating a functionality of the menu icon to identify its corresponding haptic effect. For example, as shown in **yellow** highlighting in Figure 36 above, the user has selected a menu icon for a gear, which an ordinarily skilled artisan would have recognized as pertaining to device settings. (Cooperstock, ¶51.) As Yun explains:

Referring to FIG. 36, if a user touches or approaches and thus chooses one of the menu icons, the name of the chosen menu icon may be analyzed, and a haptic effect corresponding to the name of the chosen menu icon may be generated. For example, if the user chooses a menu icon ‘setting’, haptic effects (such as vibration effects) respectively corresponding to alphabet letters ‘s’, ‘e’, ‘t’, ‘t’, ‘i’, ‘n’, and ‘g’ may be sequentially output. Alternatively, the user may set a haptic effect for the word ‘setting’ in advance. In this case, the haptic effect corresponding to the word ‘setting’ may be generated.

(Yun, ¶0109.) Yun therefore discloses that, when the user chooses a menu icon, the mobile terminal uses the textual name of the menu icon to determine the appropriate haptic effect. The resulting haptic effect is shown in the right portion (b) of Figure 36 above, which depicts the varying intensity of the haptic effect generated as a result of the user’s selection of the “setting” menu option.

Manner, Rationale and Motivation to Combine (Poupyrev and Yun):

Poupyrev, as explained, discloses an electronic device that can generate confirmation haptic effects for a GUI object with which the user is interacting. It would have been obvious to combine Poupyrev with Yun, predictably resulting in the electronic device of Poupyrev with the further ability to receive “**context metadata**” that also includes data indicating a functionality of the GUI object as taught in Yun. Under the proposed combination, the “**context metadata**” received and processed by the electronic device in Poupyrev would have also included the name of the GUI object with which the user is interacting. (Cooperstock, ¶85.)

The controller in Poupyrev, therefore, would have received “**context metadata... indicating a functionality of the user interface element,**” because it would have received (along with pressure and position information) data identifying the name associated with the GUI object with which the user is interacting. It would have been obvious that the name of the GUI object would have provided at least an indication of “**a functionality**” of the GUI object. Using the example in Yun, the name “setting” would have identified the functionality associated with a settings menu. (Cooperstock, ¶86.) As explained in more detail below, this would have enabled the controller in Poupyrev to provide tactile feedback customized based on the particular GUI object with which the user is interacting.

Petition for *Inter Partes* Review of
U.S. Patent No. 8,896,524 B2

Poupyrev and Yun are analogous references in the same field of the '524 patent of devices that produce haptic effects. ('524, 1:4-7.) Both references disclose similar techniques for generating haptic effects (such as vibrations) in response to user interaction with user interface elements through a touch screen display. These references would also have been reasonably pertinent to a number of problems facing the inventors, such as how to identify a particular user interface element with which the user is interacting, and then provide a specific haptic effect corresponding to that user interface element. (Cooperstock, ¶87.)

An ordinarily skilled artisan would have been motivated to combine Poupyrev and Yun in order to provide a clear benefit to the system of Poupyrev – the ability to deliver customized tactile feedback based on a functionality of the GUI object with which the user is interacting. (Cooperstock, ¶88.) This benefit is expressly described in Yun, which explains that “[i]n this manner, it is possible to generate different haptic effects for different menu items. Thus, it is possible for a user to easily determine which of the menu items has been touched or approached by using the sense of touch.” (Yun, ¶0079.) Using Figure 36 of Yun, the tactile feedback for the setting menu icon would have been different from the feedback provided for the phone menu icon, and so forth. Accordingly, a skilled artisan would have been motivated to implement Poupyrev to receive context metadata indicating a

functionality of the GUI object in order to deliver “**a confirmation haptic effect**” that indicates at least a functionality of the GUI object with which the user is interacting. (Cooperstock, ¶¶88-89.)

As further explained above for the preamble of claim 1, the claimed “**confirmation haptic effect**” can correspond to the tactile feedback provided in Poupyrev when the user selects or activates (actuates) a GUI object by pressing and holding for a period of time. Under the proposed combination with Yun, therefore, the controller in Poupyrev would have been enabled to tailor that confirmation haptic effect based on a functionality of the GUI object. This would have provided the further benefit of providing tactile feedback that not only indicates to a user that the GUI object has been selected or activated, but also allows the user to determine through the tactile feedback the identity of the GUI object being selected or activated. (Cooperstock, ¶¶89-90.) An ordinarily skilled artisan would have had at least a reasonable expectation of success, and could have implemented the proposed combination using nothing more than rudimentary programming techniques familiar to even beginning programmers. (Cooperstock, ¶91.)

(b) “mapping the received context metadata to one or more haptic parameters;” (Limitation 1[b])

For convenience, Petitioner will first identify how the prior art discloses and renders obvious “**one or more haptic parameters,**” and then explain how the step

of “**mapping**” occurs in the prior art. The “**one or more haptic parameters**” corresponds to parameters that define the haptic effects provided to the user. Although limitation 1 [b] only requires one such haptic parameter, Poupyrev and Yun discloses multiple examples that satisfy the claim.

The written description of the '524 patent states that “[a] haptic parameter is a quantity of a haptic effect quality, such as magnitude, frequency, duration, amplitude (i.e., strength), waveform, or any other kind of quantifiable haptic parameter.” ('524, 6:23-25.) These are also consistent with the examples recited in dependent claim 7, addressed in **Part VI.B.4** below. ('524, 12:12-16 (Claim 7).) Petitioner has argued in the pending litigation that “**haptic parameter**” should be construed based on the above-quoted language from the written description, while Patent Owner contends this term should be given its plain and ordinary meaning and does not require construction. (EX1008, p.002.) In any case, Poupyrev and Yun disclose multiple examples of haptic parameters.

Poupyrev discloses at least frequency and amplitude haptic parameters. (Poupyrev, 2:41-43 (“In another embodiment of the present invention, the haptic feedback is controlled in either a frequency, an amplitude or both amplitude and frequency simultaneously.”).) Yun discloses similar haptic parameters of vibration intensity and pattern. (Yun, ¶0042 (“If the haptic module **157** generates vibration as

a haptic effect, the intensity and the pattern of vibration generated by the haptic module **157** may be altered in various manners.”.)

Although not necessary to satisfy the claim, it would have been obvious that the “intensity” parameter in Yun corresponds to at least the “amplitude” and/or “magnitude” parameters identified as exemplary haptic parameters in the ’524 patent. (Cooperstock, ¶93.) This is because the ’524 patent equates amplitude with strength, and treats intensity as synonymous with both amplitude and magnitude. (’524, 10:5-8 (“Examples of a haptic parameter can include a magnitude haptic parameter, a frequency haptic parameter, a duration haptic parameter, an amplitude (i.e., strength) haptic parameter, and a waveform haptic parameter...”), 5:49-51 (“...the magnitude (or amplitude or intensity) of the confirmation haptic effect should be increased.”).) The term “amplitude” in the context of vibration haptic effects would have been understood as referring generally to the maximum amount of oscillation provided by the actuator, which would have determined the intensity and strength of the vibration. (Cooperstock, ¶93.) It would also have been obvious that the “pattern” parameter in Yun corresponds to at least a waveform haptic parameter disclosed in the ’524 patent. (*Id.* (citing ’524, 7:46-49 (“Yet another example of a haptic parameter is a waveform haptic parameter (identified in FIG. 2 as waveform **234** [sic; **233**]), where a waveform duration haptic parameter defines a

waveform value of the confirmation haptic effect.”)).) This is shown in part (b) of Figure 36 of Yun, which shows how the haptic effect for each letter in the menu icon name has a distinct waveform of intensity over time. (Yun, Fig. 36, Part (b).)

The proposed combination, therefore, discloses at least four of the exemplary “**haptic parameters**” identified as examples in the ’524 patent.

The proposed combination also discloses and renders obvious “**mapping the received context metadata**” to one or more of these haptic parameters. Petitioner notes that the ’524 patent does not prescribe any particular process or technique for carrying out the “**mapping**” step. The written description of the ’524 patent, in fact, describes this step as requiring nothing more than correlating at least one haptic parameter to at least some portion of the context metadata:

As part of the mapping, the context metadata can be mapped to the one or more haptic parameters (identified in FIG. 2 as context metadata mapping **221**). More specifically, the one or more haptic parameters can each include a value that can be based, at least in part, on the context metadata.

(’524, 6:36-41.)

The “**mapping**” step occurs under the proposed combination when the controller in Poupyrev determines the amplitude, frequency, intensity and/or pattern of the haptic effect to be provided based on the context metadata of limitation 1 [a].

For example, taking the first example of context metadata in limitation 1[a] above indicating “**a history of the user interface element**,” the controller in Poupyrev performs the “**mapping**” step by identifying the appropriate haptic feedback based on the context metadata (*i.e.*, position, pressure, and history). This is because the controller in Poupyrev determines the logical state of the GUI object based on its history, and then uses the logical state in selecting the appropriate haptic feedback to be provided:

The controller section determines a current logical state of the graphical user interface object using a history of detected touch positions and a history of detected pressure values. The controller section **determines a form of the haptic feedback to be generated** depending on (i) the detected touch position, (ii) the detected pressure value and (iii) the determined current logical state of the graphical user interface object.

(Poupyrev, 2:8-14; *see also id.*, 7:39-42 (“In another embodiment of the present invention, a history of the previous input and a history of the previous states of the GUI objects is used to determine the tactile feedback to the user 2.”).) Poupyrev expressly discloses mapping (*i.e.* dynamically correlating) the context metadata with the tactile feedback presented to the user:

The control section **20** dynamically correlates: (i) the touch position on the screen or a GUI object selected by the user’s input operation; (ii) the pressure applied on the screen by the user’s input operation; and

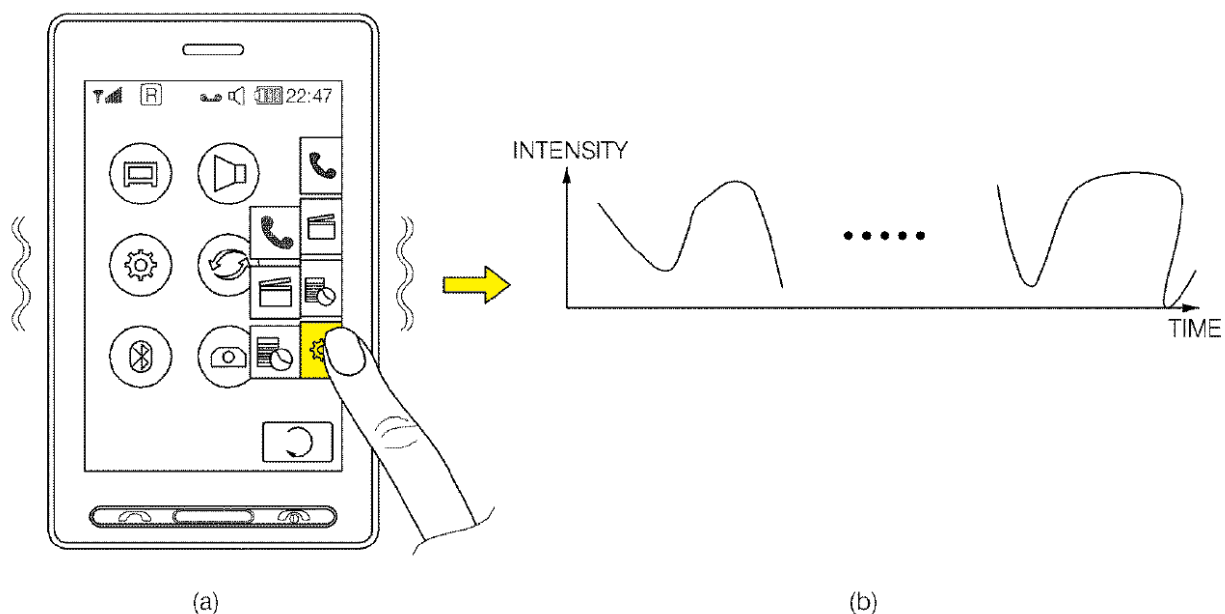
(iii) a current logical state of the selected GUI object; with the type of tactile feedback to be presented to the user 2.

(Poupyrev, 5:11-16.) Item (iii) above, “a current logical state of the selected GUI object” (*id.*), is based directly on a history of the GUI object as explained above, which in turn is used to determine the appropriate type of tactile feedback. And as explained above, “the type of tactile feedback to be presented to the user 2” (*id.*), is based on the frequency and/or amplitude parameters (“**one or more haptic parameters**”). (Poupyrev, 2:41-43 (“In another embodiment of the present invention, the haptic feedback is controlled in either a frequency, an amplitude or both amplitude and frequency simultaneously.”), 10:43-67 (describing how to vary frequency, amplitude, and other parameters to generate tactile feedback).) Poupyrev thus discloses that the controller “dynamically correlates” (*i.e.*, “**map[s]**”) the context metadata to the one or more haptic parameters.

The “**mapping**” step also occurs when the context metadata indicates “**a functionality of the user interface element,**” under the proposed combination of Poupyrev and Yun as described for limitation 1[a] above. The step of “**mapping**” in this case occurs when the controller in Poupyrev uses the context metadata about the GUI object (indicating a functionality of the GUI object) to determine the appropriate haptic feedback to provide to the user. As noted previously, Yun states that “if a user touches or approaches and thus chooses one of the menu icons, the

name of the chosen menu icon may be analyzed, and a haptic effect corresponding to the name of the chosen menu icon may be generated.” (Yun, ¶0109.) As a result, under the proposed combination of Poupyrev and Yun, the pattern and intensity of the haptic effect (“**one or more haptic parameters**”) would have been selected based at least in part on the name of the GUI object. This is shown in Figure 36, again shown below for convenience:

FIG. 36



(Yun, Fig. 36 (highlighting added).) User activation of the “**setting**” menu icon in Figure 36(a) resulted in a haptic effect having a vibration intensity and pattern that is specific to the name of that menu icon, as shown in Figure 36(b). (Yun, ¶0109 (“For example, if the user chooses a menu icon ‘setting’, haptic effects (such as vibration effects) respectively corresponding to alphabet letters ‘s’, ‘e’, ‘t’, ‘t’, ‘i’,

‘n’, and ‘g’ may be sequentially output.”), Yun, ¶0133 (“As described above, according to the present invention, it is possible to generate different haptic effects having different intensities and/or different patterns for different haptic regions of an object such as a menu icon, a control icon, a touch key and an image for controlling the operation of a mobile terminal.”).)

As explained previously, the ’524 patent does not prescribe any particular process for performing the “**mapping**” step, and describes it as nothing more than correlating at least one haptic parameter to at least some portion of the context metadata. (’524, 6:36-41.) This certainly occurs in Yun, which repeatedly discloses identifying haptic feedback “corresponding” to the name of a GUI object with which the user has interacted. (Yun, *e.g.*, ¶0109 (“... a haptic effect corresponding to the name of the chosen menu icon may be generated”).) It would have been obvious that, under the proposed combination of Poupyrev and Yun, determining the haptic feedback provided to the user would have included correlating (“**mapping**”) the context metadata – which includes the name of the chosen GUI object – to at least the intensity and pattern parameters (“**one or more haptic parameters**”) of the confirmation haptic effect to be provided to the user. (Cooperstock, ¶¶94, 96.)

- (c) **“generating a haptic signal based at least in part on the one or more haptic parameters; and” (Limitation 1[c])**
- (d) **“sending the haptic signal to an actuator to generate the confirmation haptic effect.” (Limitation 1[d])**

These two final limitations of claim 1 are closely-related and thus will be addressed together. For purposes of limitation 1[c], the claimed **“haptic signal”** corresponds to a signal generated by signal generation unit **106** (Fig. 1) in Poupyrev, which is sent to haptic feedback generating unit **102** comprising an actuator that generates the confirmation haptic effect. These components and the flow of the haptic signal are shown in Figure 1 of Poupyrev:

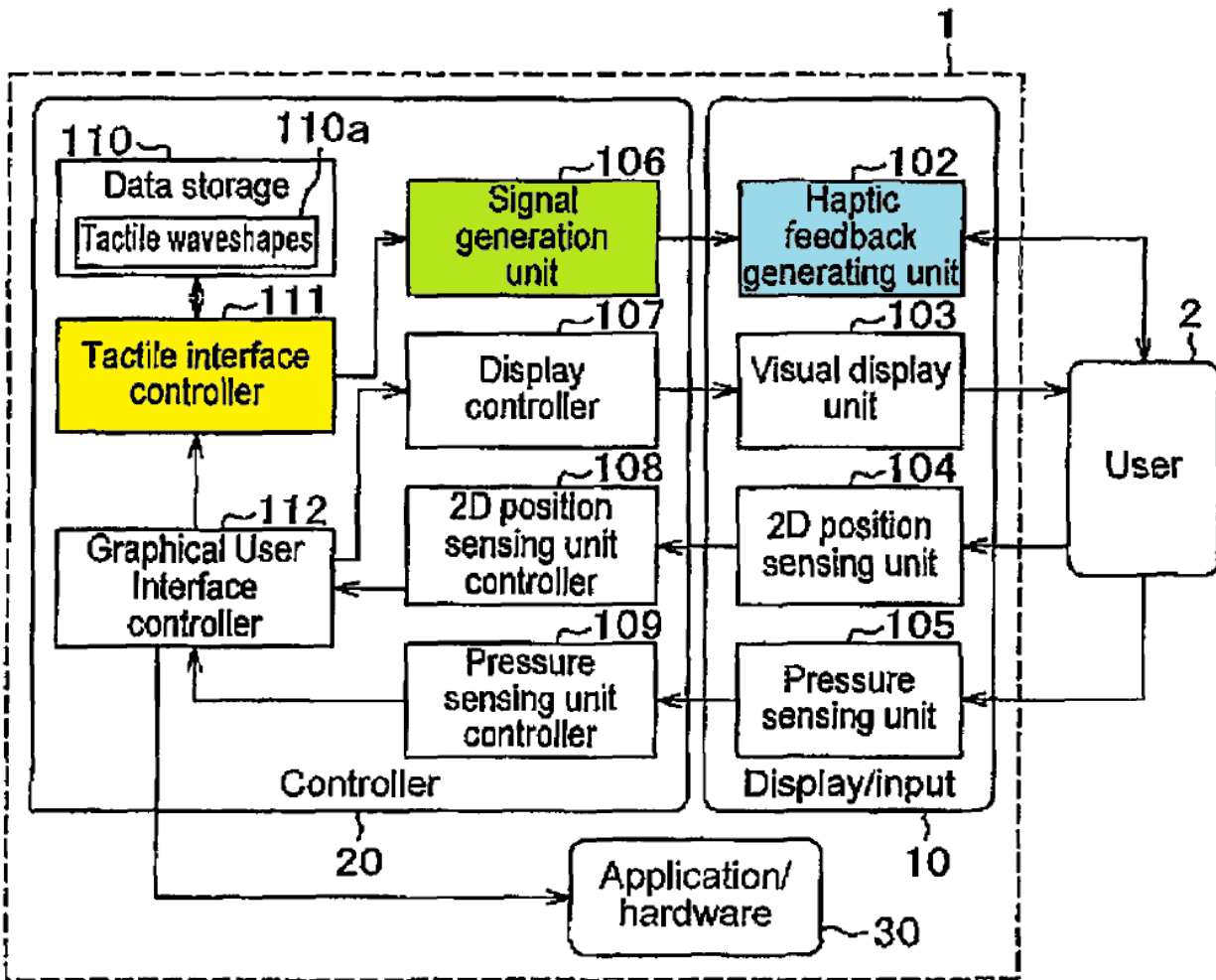


Figure 1

(Poupyrev, Fig. 1 (highlighting added).) Poupyrev explains that, after the haptic parameters discussed for limitation 1 [b] have been identified, the GUI controller 112 sends appropriate commands to the tactile interface controller 111, which in turn sends appropriate commands to signal generation unit 106, as shown in Figure 1. (Poupyrev, 7:29-31, 6:43-46.) “The signal generating unit 106 generates and provides a signal to the tactile feedback generating unit 102 for driving tactile feedback generating elements or the piezoelectric actuators.” (Poupyrev, 6:43-46.)

“The haptic feedback generating unit 102 may be formed with piezoelectric bimorph actuators with single or multiple layer structure.” (Poupyrev, 5:38-40.)

Accordingly, the claimed “**haptic signal**” corresponds in Poupyrev to the signal generated and sent by signal generation unit 106, and the claimed “**actuator**” corresponds to tactile feedback generating unit 102 that receives the haptic signal and generates a corresponding haptic effect. And as explained for the preamble, the haptic effect provided by the controller qualifies as a “**confirmation**” haptic effect, as claimed. (Cooperstock, ¶¶67-72.) And this “**confirmation haptic effect**,” as explained for limitation 1[b], would have been selected based on the context metadata including data indicating either a history or functionality of the GUI element. (Cooperstock, ¶¶94-95, 98.)

2. Claim 2: “The non-transitory computer-readable medium of claim 1, further comprising modifying the one or more haptic parameters based on user input.”

The ability to modify the one or more haptic parameters would have been obvious based on Poupyrev in view of Yun. As shown below, Yun expressly discloses the ability to modify one or more of the haptic parameters. Petitioner has also provided a separate **Ground 2** below addressing claim 2.

As explained for limitation 1[b], the “**one or more haptic parameters**” for Yun include at least the vibration intensity and pattern. (Cooperstock, ¶¶93, 100.)

With respect to “**user input**,” Yun explains that, in one embodiment, “[a] user may determine in advance the intensity and pattern of vibration to be output for the input character or the input character string.” (Yun, ¶0071.) Two claims in the published Yun application, in fact, expressly disclose display of “a menu for setting at least one of the type, the intensity, and the pattern of a haptic effect for each of the haptic regions on the touch screen.” (Yun, claims 11, 20.) It would therefore have been obvious that Yun discloses the ability of the user to “**modif[y]**” at least the intensity and pattern haptic parameters associated with a haptic effect, for example, by modifying default haptic parameters or by modifying parameters that had been previously set by the user. (Cooperstock, ¶100; Yun, ¶0106 (“If vibration is generated as a haptic effect, the intensity and the pattern of vibration to be generated for the predefined word may be set and altered by the user.”).)

In the example in ¶0071 of Yun discussed above, user modification of the intensity and pattern occurs in the context of the character input mode feature of Figure 7 rather than the menu icon feature of Figure 36 relied upon for limitation 1[a]-[b]. (Yun, ¶¶0069-0071, Fig. 7.) But Federal Circuit law is clear that “[c]ombining two embodiments disclosed adjacent to each other in a prior art patent does not require a leap of inventiveness.” *Boston Scientific Scimed, Inc. v. Cordis Corp.*, 554 F.3d 982, 991 (Fed. Cir. 2009). It would have been obvious to implement

the proposed combination such that user modifications to the intensity and/or pattern parameters for input characters and/or for character strings, as described in ¶0071 of Yun, would also have applied to the haptic effects provided for those same characters and/or character strings when used as the name of menu icons for the menu icon embodiment of Figure 36. (Cooperstock, ¶101.)

This is because, as explained, the menu icon feature in Yun in one embodiment generates haptic effects *based on the individual characters in the name of the menu icon*. (Yun, ¶0109.) In an alternative embodiment, “the user may set a haptic effect for the word ‘setting’ in advance.” (Yun, ¶109.) It would have been obvious that by modifying the intensity and/or pattern for individual characters and/or a character string via the character input feature discussed above (Yun, ¶0071), those same modifications would have applied to the haptic effects generated when a menu icon is selected whose name contains those characters or that character string. For example, user modification to the intensity and/or pattern for the character “t” would have applied to the haptic effects corresponding to that character – both in response to input of that character in character input mode and in response to selection of a menu icon whose name includes one or more instances of that character. (Cooperstock, ¶101.) Under the alternative embodiment discussed above, user modification to the intensity and/or pattern for the character string

“setting” would have applied to the haptic effects provided *both* in response to input of that character string in character input mode, and in response to selection of a menu whose name includes that string. (*Id.*)

An ordinarily skilled artisan would have been motivated to implement Yun in this manner to provide greater uniformity and consistency in the haptic effects provided to the user. (Cooperstock, ¶102.) In many human-computer interfaces, consistency was and remains today a desirable goal because it enables the user to transfer knowledge obtained through one aspect of the user interface to other aspects. In the context of the proposed combination, it would have been beneficial for the knowledge and recognition the user obtains about haptic effects through one feature (*e.g.*, the character input mode of Figure 7) to also apply to other features of the device (*e.g.*, the menu icon selection of Figure 36). (*Id.*) The proposed combination therefore renders obvious “**modifying the one or more haptic parameters based on user input,**” as recited in claim 2.

And moving beyond the menu icon feature of Figure 36 of Yun discussed above, more fundamentally, it would have been obvious to allow user modification of at least the intensity haptic parameter regardless of the user interface context in which the haptic effect is generated. This is because, as was well-known, each user could have differed from other users in their ability to perceive haptic vibrations

based on several factors including the user's age, health, level of familiarity with the device, surrounding environment, among others. Accordingly, a haptic vibration with an intensity appropriate for one user may have been too weak for another user, or too strong for yet another. Allowing the user to modify the intensity parameter, as disclosed in Yun, would have benefitted the proposed combination by affording a greater degree of user customization and would have improved the effectiveness and comfort of haptic effects. (Cooperstock, ¶103.)

3. Claim 6: “The non-transitory computer-readable medium of claim 1, wherein the context metadata further comprises at least one of: data indicating one or more physical properties of the user interface element, or sensor input data.”

As explained for limitation 1[a], the “**context metadata**” comprises (among other things) information about the position on the screen where user interaction is taking place, and the amount of pressure applied by the user. Both of these pieces of data comprise “**sensor input data**,” because they are provided by components that Poupyrev expressly describes as sensors. (Cooperstock, ¶¶104-105.)

For example, as explained for limitation 1[a], the display/input section **10** (Figure 1) includes “a two-dimensional (2D) position sensing unit 104 and a pressure sensing unit 105.” (Poupyrev, 5:23-26.) With respect to the *position* sensing unit, it “detects where the user is touching on the touch screen.” (Poupyrev, 6:3-4.) That information is provided to position sensing unit controller **108**, part of controller **20**,

which “determines the position where the user **2** is touching on the screen.” (Poupyrev, 7:3-4.) With respect to the *pressure* sensing unit, pressure sensing unit **105**, it “measure[s] pressure applied to the touch screen by the user’s input operation.” (Poupyrev, 5:46-47, 5:33-34.) That information is in turn fed into pressure sensing unit controller **109**, which “determines the value of pressure applied when the user is touching on the screen.” (Poupyrev, 7:1-3.)

Poupyrev therefore discloses at least two examples in which the context metadata “**comprises... sensor input data.**” The “**sensor input data**” comprises data about position and pressure that were input and communicated to the controller using, respectively, the position and pressure sensing units and controllers as described in detail above. (Cooperstock, ¶¶76, 105.)

4. **Claim 7: “The non-transitory computer-readable medium of claim 1, wherein the one or more haptic parameters comprises at least one of: a magnitude haptic parameter, a frequency haptic parameter, a duration haptic parameter, an amplitude haptic parameter, or a waveform haptic parameter.”**

As fully explained for limitation 1[b], the proposed combination discloses and renders obvious at least four distinct haptic parameters, including for Poupyrev, “**frequency**” and “**amplitude**” haptic parameters. (Cooperstock, ¶¶93, 106; Poupyrev, 2:41-43 (“[T]he haptic feedback is controlled in either a frequency, an amplitude or both amplitude and frequency simultaneously.”), 10:43-64.) With

respect to Yun, as explained for limitation 1[b], it discloses “**one or more haptic parameters**” that include at least an intensity parameter that qualifies as an “**amplitude**” and/or “**magnitude**” haptic parameter, and a pattern parameter that qualifies as at least a “**waveform**” parameter. (Cooperstock, ¶¶93, 106; *see also* Yun, ¶0042 (“If the haptic module **157** generates vibration as a haptic effect, the intensity and pattern of vibration generated by the haptic module **157** may be altered in various manners.”).) Accordingly, although claim 7 only requires one of the five recited examples, Poupyrev and Yun disclose at least four examples of haptic parameters, each independently satisfying the claim.

5. Claim 8: “The non-transitory computer-readable medium of claim 1, wherein the user interface element comprises at least one of: a physical element of a device or a virtual element of a device.”

As explained for limitation 1[a], the “**user interface element**” comprises at least “**a virtual element of a device**,” such as a selectable option like a button displayed on the touch screen of a device. (Cooperstock, ¶107.) Poupyrev explains that “[t]he display/input section **10** displays on a touch screen thereof images of buttons, keys, switches or any other Graphic User Interface (GUI) objects to prompt a user **2** to interact with the apparatus **1**.” (Poupyrev, 4:66-5:2.) These GUI objects can include “images of buttons, sliders, drawing, scroll bars, hyper links and etc.” (Poupyrev, 5:28-31.) This is consistent with the ’524 patent, which expressly

identifies a button displayed on a touchscreen device as an example of a virtual interface element. ('524, 4:4-7.)

6. Claims 11-14

Claims 11-14 are substantially identical to claims 1-2 and 6-7, respectively, which were fully addressed above. The only difference is that claims 11-14 are written as computer-implemented method claims. (Cooperstock, ¶108.) The steps of those claims are performed by the apparatus in Poupyrev, alone or in combination with Yun, or the reasons explained for claims 1-2. (Cooperstock, ¶109.)

C. Ground 2: Claims 2-4 and 12 Are Obvious Over Poupyrev and Yun in View of Braun and Rosenberg.

Dependent claims 2-4 and 12 generally relate to features for allowing modification of “**the one or more haptic parameters**” of claims 1 and 11, based on user input. Claims 2 and 12 are obvious based on Poupyrev and Yun as explained for **Ground 1**, but Poupyrev and Yun do not appear to disclose the more specific features of claims 3-4. But these additional features of claims 3-4, are obvious in further view of **Braun** and **Rosenberg**, as discussed below. And because claims 3-4 depend on claim 2 (which is substantially similar to claim 12), Petitioner will also explain how Braun and Rosenberg apply to claims 2 and 12.

1. Claim 2: “The non-transitory computer-readable medium of claim 1, further comprising modifying the one or more haptic parameters based on user input.”

As fully explained for limitation 1[c], the “**one or more haptic parameters**” under the proposed combination include at least the strength of the vibration haptic effect, *e.g.*, amplitude and/or magnitude haptic parameters.

Braun discloses a technique for modifying a magnitude haptic parameter based on user input. Braun discloses a technique for providing “force feedback” to a user of an interface device, such as a mouse or joystick. The term “force feedback” is generally synonymous with “haptic feedback” or “haptic effects.” (Cooperstock, ¶¶55, 112; *see also* ’524, 1:11-14 (“Haptics is a tactile and force feedback technology that takes advantage of a user’s sense of touch by applying haptic feedback effects (i.e., ‘haptic effects’), such as forces, vibrations, and motions, to the user.”).) Braun explains that a force feedback effect or sensation can include vibrations having parameters defining the vibration effect. (Braun, 18:62-19:4.) “For example, a vibration force effect may have parameters of duration, frequency, magnitude, and direction.” (Braun, 19:2-3; *see also id.*, 17:17-19 (“For example, the assigned force sensation **244** can be a vibration force having a specified frequency, magnitude, duration, etc.....”).)

Figure 5 of Braun shows an exemplary user interface dialog box **240** showing

various options that allow modification of these parameters, including the magnitude parameter (248), based on user input:

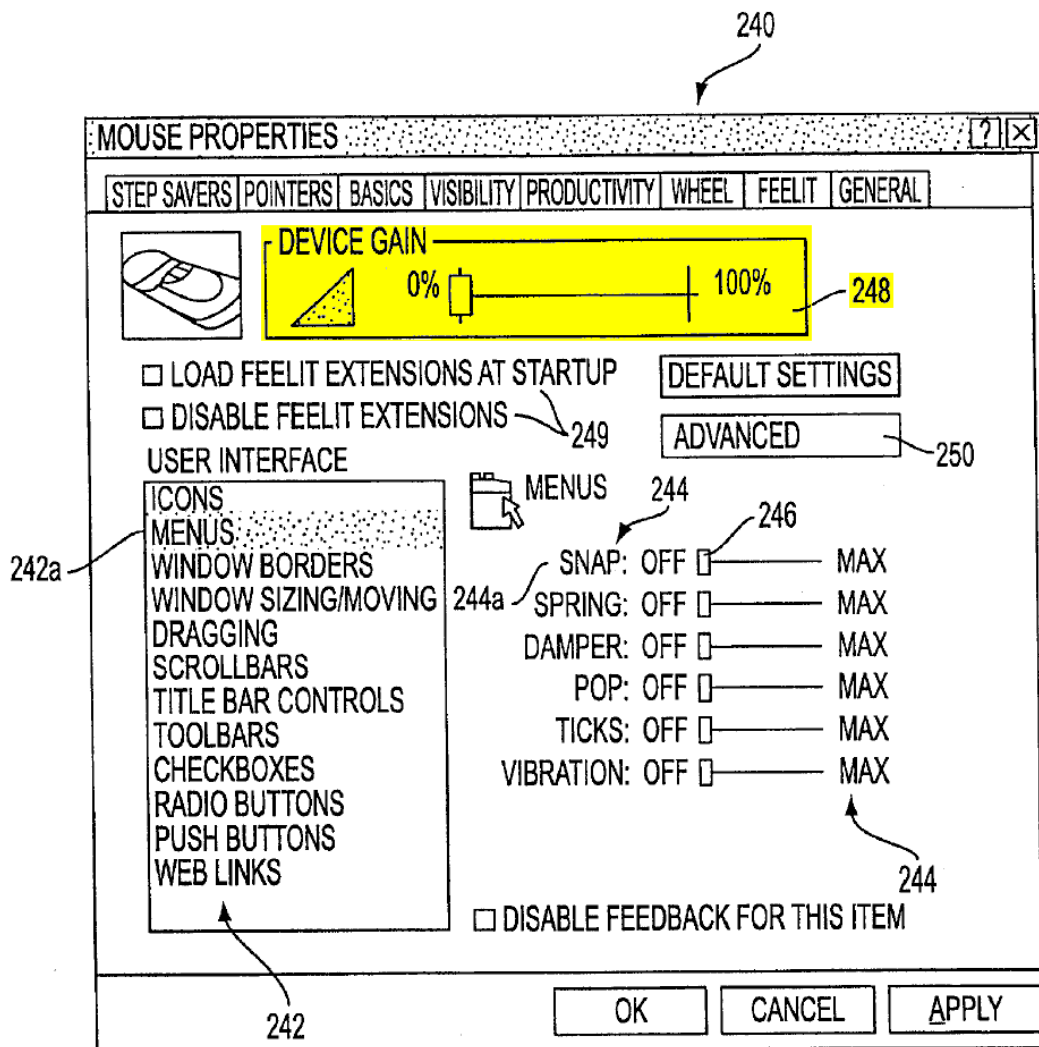


FIG. 5

(Braun, Fig. 5 (highlighting added).)

Dialog box 240 above shows a list of user interface objects 242 including icons, menus, among others. Each user interface object can have one or more

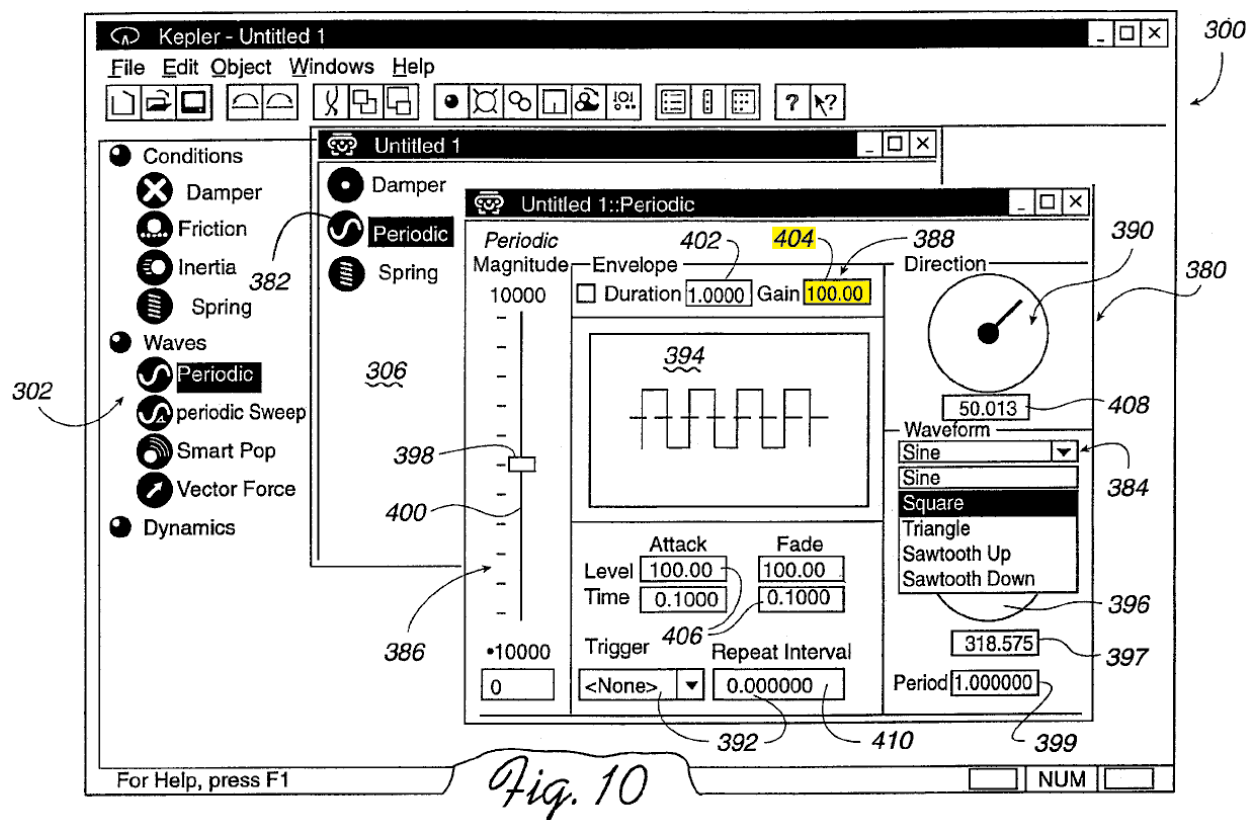
associated force sensations or effects **244**, such as snap, spring, vibration, among others. Each force sensation or effect is also shown with an accompanying slider **246** ranging from “OFF” to “MAX,” which the user can move to the right to specify its magnitude. (Braun, 17:30-38, 17:53-57.) For example, as shown in Figure 5, the user is specifying the magnitude of the “SNAP” force effect **244a** for the “MENUS” user interface object **242a**. (Braun, 17:34-38.)

The key feature of Braun for purposes of **Ground 2** is the device gain **248** slider control shown in highlighting, which allows the user to globally adjust the magnitude of force sensations or effects for user interface objects between 0% and 100%. Braun explains that device gain **248** allows the user “to set the percentage of maximum magnitude for all the forces for items **242**....” (Braun, 18:62-65.)

Rosenberg discloses a similar feature. Rosenberg describes a tool for designing force sensations for use with a force feedback interface device, such as a computer mouse. (Rosenberg, Abstract.) Rosenberg is closely related to Braun, both having originated from Patent Owner and having two common named inventors. Braun also expressly incorporates-by-reference the disclosures of Rosenberg, and Braun’s disclosures relating to Figure 5 above also expressly mention Rosenberg. (Braun, *e.g.*, 17:37-40, 18:8-14.)

Rosenberg discloses a similar user interface **300** for adjusting the parameters

of force sensations or effects, including the magnitude (404):



(Rosenberg, Fig. 10 (highlighting added).) Figure 10 shows user interface 300 for modifying the parameters associated with a periodic wave sensation. (Rosenberg, 19:58-62.) Figure 10 shows a number of “[e]nvelope parameters 388 [that] allow the user to shape the waveform into a desired effect.” (Rosenberg, 20:18-19.) The key parameter shown here is field 404, in highlighting, which performs a function similar to device gain 248 in Braun. As Rosenberg explains, this field is “a gain field 404 (where ‘gain’ can be used as a global scaling factor or multiplier for force magnitudes output by the interface device 14)....” (Rosenberg, 20:19-24.)

Braun and Rosenberg thus disclose “**modifying the one or more haptic**

parameters based on user input,” *i.e.*, modifying at least the magnitude haptic parameter based on user input (for example through device gain **248** slider control of Braun or gain field **404** in Rosenberg). (Cooperstock, ¶¶112-117.)

Rationale and Motivation to Combine (Ground 1 Prior Art with Braun and Rosenberg): It would have been obvious to combine the prior art cited for **Ground 1** (Poupyrev and Yun) with Braun and Rosenberg. The combination would have predictably resulted in the electronic device described for **Ground 1**, with the further ability to enable modification (based on user input) of a haptic parameter that defines the maximum magnitude for haptic effects. This, in turn, would have predictably resulted in modifying the magnitude parameter of the confirmation haptic effect delivered to the user. (Cooperstock, ¶118.) As explained for limitation 1**[b]**, the ’524 patent treats “magnitude” as synonymous with amplitude and intensity as disclosed in Poupyrev and Yun. (Cooperstock, ¶93 (citing ’524, 10:5-8 & 5:49-51).)

The claimed “**user input**” could have been obtained using any number of well-known techniques such as a slider control disclosed in Braun, a text field as disclosed in Rosenberg, or using other conventional techniques. (Cooperstock, ¶118.) The “**user input**” itself would have taken the form of a percentage value, as described in both Braun and Rosenberg (*id.*), for example by defining “the percentage of maximum magnitude” (Braun, 18:62-65) for the confirmation haptic

effect provided to the user. (*See also* Rosenberg, 14:2 (“... 50% magnitude”).)

Braun and Rosenberg are analogous references in the same field of the ’524 patent of devices that produce haptic effects. (Cooperstock, ¶119.) Both references disclose similar techniques for generating haptic effects (such as vibrations) in response to user interaction with a device, which can have adjustable parameters such as magnitude. These references would also have been reasonably pertinent to a number of problems facing the inventors, such as how to enable modification of one or more haptic parameters based on user input. (Cooperstock, ¶119.) And as noted, Braun refers to and incorporates-by-reference the disclosures of Rosenberg, thus confirming that they are analogous references and fully combinable with one other. (Braun, *e.g.*, 17:37-40, 18:8-14.)

The proposed combination would have provided a clear benefit to the system of Poupyrev as described in **Ground 1** – the ability of the user to customize the magnitude of haptic vibration effects provided through the electronic device. As explained in the discussion of claim 2 in **Part VI.B.2**, it was well known that each user could have differed from other users in their ability to perceive haptic vibrations based on several factors including the user’s age, health, level of familiarity with the device, surrounding environment, among others. (Cooperstock, ¶¶103, 120.) Accordingly, a haptic vibration with an intensity appropriate for one user may have

been too weak for another user, or too strong for yet another user. Allowing the user to modify the magnitude parameter, as disclosed in Braun and Rosenberg, would have provided a clear benefit to the proposed combination by affording a greater degree of user customization thus improving the effectiveness and comfort of haptic effects provided to the user. (Cooperstock, ¶120.)

An ordinarily skilled artisan would have had at least a reasonable expectation of success. Although Braun and Rosenberg disclose force feedback effects provided through a user input device such as a mouse or joystick, an ordinarily skilled artisan would have found this difference to lack any significance. The ability to obtain user input on which to base such a modification would have involved nothing more than rudimentary programming techniques familiar to even beginning programmers, such as soliciting user input through a graphical user interface. An ordinarily skilled artisan would have found the disclosures of Poupyrev, Yun, Braun, and Rosenberg more than adequate to implement the teachings relied upon in this Petition, using conventional programming techniques and without having to resort to undue experimentation. (Cooperstock, ¶121.)

2. **Claim 3: “The non-transitory computer-readable medium of claim 2, wherein the user input comprises one or more multipliers defined by the user; and wherein each value included for each of the one or more haptic parameters is based on the one or more multipliers.”**

As explained for claim 2 above, the “**user input**” in Braun and Rosenberg corresponds to a percentage value provided by the user, for example through device gain **248** slider control of Braun, gain field **404** in Rosenberg, or other user input mechanism. (Cooperstock, ¶118.) It would have been obvious that a percentage value provided by a user “**comprises one or more multipliers defined by the user,**” and that at least a value of the magnitude haptic parameter is “**based on the one or more multipliers.**”

The term “**multiplier,**” as anyone familiar with arithmetic would have recognized, generally refers to a quantity or value by which another number (referred to as the multiplicand) is multiplied. (Cooperstock, ¶123; *see also Microsoft Computer Dictionary* (5th ed. 2002), p.0022 (EX1007) (“**multiplier** *n.* 1. In arithmetic, the number that indicates how many times another number (the multiplicand) is multiplied.”).) It would have been obvious that the percentage value provided by a user (“**user input**”) comprises a multiplier because it would have been used to scale the magnitude of haptic feedback effects that will be delivered to the user. (Cooperstock, ¶123.) For example, if the “**user input**” specified a maximum

magnitude of 50% for vibration haptic effects, then the magnitude value corresponding to each haptic effect delivered to the user would have been multiplied (*e.g.*, by “0.5”) and thus delivered at a correspondingly reduced magnitude. (*Id.*) Indeed, Rosenberg explicitly identifies the value in gain field 404 as a “**multiplier**.” (Rosenberg, 20:19-24 (“For example, parameters 388 preferably include... a gain field 404 (where ‘gain’ can be used as a global scaling factor or multiplier for force magnitudes output by the interface device 14)...”), 14:2 (“... 50% magnitude”).)

It therefore would have been obvious under the proposed combination that “**the user input comprises one or more multipliers defined by the user,**” *i.e.*, a percentage value provided by the user through the user interface, and that “**each value included for each of the one or more haptic parameters is based on the one or more multipliers,**” *i.e.*, because the value of at least the magnitude haptic parameter would have been scaled based on the percentage value defined by the user, *e.g.*, by multiplying the value associated with the magnitude parameter by the percentage multiplier to calculate a haptic parameter for the magnitude of the confirmation haptic effect. (Cooperstock, ¶124.)

3. Claim 4: “The non-transitory computer-readable medium of claim 3, wherein the one or more multipliers are globally defined for all user interface elements.”

This further limitation is disclosed and rendered obvious by Braun which, as

discussed above, discloses device gain 248 slider control. Figure 5 of Braun discussed above shows that the value provided by the user for device gain 248 applies to all of user interface objects 242 and all force feedback effects or sensations 244. (Braun, 17:62-64 (“Other controls in box 240 include a device gain 248 to set the percentage of maximum magnitude for all the forces for items 242....”).) Rosenberg similarly discloses the value in gain field 404 as “a global scaling factor or multiplier for force magnitudes output by the interface device 14.... (Rosenberg, 20:19-23.) Under the proposed combination, therefore, it would have been obvious to implement the system based on Poupyrev and Yun such that the percentage value provided by the user (“**the one or more multipliers**”) applied globally to all GUI objects (“**all user interface elements**”). (Cooperstock, ¶125.)

The motivation to implement the proposed combination in this manner flows directly from the observation earlier that each user could have differed from other users in their ability to perceive haptic vibrations based on several factors. (Cooperstock, ¶¶103, 120.) It would have been obvious and beneficial to apply the user’s preference regarding the maximum magnitude of haptic feedback effects across all GUI objects, in order to provide greater uniformity and consistency in the haptic effects delivered to the user across all features of the electronic device. (Cooperstock, ¶126.) This would, in turn, have resulted in an improvement to the

effectiveness and comfort of haptic effects provided to the user across all GUI objects presented on the touch screen display. (*Id.*)

4. Claim 12: “The computer-implemented method of claim 11, further comprising modifying the one or more haptic parameters based on user input.”

Claim 12 is substantially identical to claim 2 except that it is written in the form of a computer-implemented method. Claim 12 is obvious based on the combination of Poupyrev, Yun, Braun, and Rosenberg for the same reasons as claim 2 provided above. (Cooperstock, ¶¶111-121.)

VII. CONCLUSION

Petitioner respectfully requests institution of review on the challenged claims.

Dated: May 25, 2023

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Petition for *Inter Partes* Review of
U.S. Patent No. 8,896,524 B2

CERTIFICATE OF COMPLIANCE WITH WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), I certify that this petition complies with the type-volume limits of 37 C.F.R. § 42.24(a)(1)(i) because it contains 11,054 words, according to the word-processing system used to prepare this petition, excluding the parts of this petition that are exempted by 37 C.F.R. § 42.24(a) (including the table of contents, a table of authorities, mandatory notices, a certificate of service or this certificate word count, appendix of exhibits, and claim listings).

DATED: May 25, 2023

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Petition for *Inter Partes* Review of
U.S. Patent No. 8,896,524 B2

CERTIFICATE OF SERVICE

I hereby certify, pursuant to 37 C.F.R. Sections 42.6 and 42.105, that a complete copy of the attached **PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,896,524 B2**, including all exhibits (**Nos. 1001-1010**) and related documents, are being served via Federal Express on the 25th day of May, 2023, the same day as the filing of the above-identified document in the United States Patent and Trademark Office/Patent Trial and Appeal Board, upon Patent Owner by serving the correspondence address of record with the USPTO as follows:

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