

**IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
AUSTIN DIVISION**

HAPTIC, INC.,

Plaintiff,

v.

APPLE INC.,

Defendant.

CIVIL ACTION NO. 1:23-CV-1351-DII

JURY TRIAL DEMANDED

Plaintiff's Preliminary Infringement Contentions

Pursuant to the Joint Federal Rule of Civil Procedure 26 Report (Dkt. 40), Plaintiff Haptic, Inc. (hereinafter "Haptic") hereby serves its Preliminary Infringement Contentions and disclosure of priority date to Defendant Apple Inc. (hereinafter "Apple"). Haptic expressly reserves all objections relative to their use, for any purpose, and does not waive any applicable privileges with respect to the information disclosed herein or accompanying document productions.

Haptic makes this disclosure to the best of its present ability and without the benefit of discovery. Haptic's investigation is ongoing, and this disclosure is based on information reasonably available to Haptic as of this date. Haptic reserves the right to supplement or amend these disclosures, its contentions in this case, and its document productions pursuant to these disclosures consistent with the Federal Rules of Civil Procedure, Local Rules, and Court Orders. By making these disclosures, Haptic does not waive any applicable privilege, work product, or other protection, and reserves the right to object to the production or admissibility of any information provided herein.

I. PRELIMINARY INFRINGEMENT CONTENTIONS

The preliminary infringement contentions set forth herein, including without limitation the claim charts attached hereto as **Exhibits A and B**, which are fully incorporated by reference herein,

identify, based on publicly available information, and upon information and belief, where in the iPhone 8, 8 Plus, X, XS, XS Max, XR, 11, 11 Pro, 11 Pro Max, SE, SE2, SE3, 12, 12 Mini, 12 Pro, 12 Pro Max, 13, 13 Mini, 13 Pro, 13 Pro Max, 14, 14 Plus, 14 Pro, 14 Pro Max, 15, 15 Plus, 15 Pro, and 15 Pro Max models (“Accused Products”) each element of claims 1, 2, 4, 5, and 9 (“Asserted Claims”) of U.S. Patent No. 9,996,738 (“’738 Patent” or “Asserted Patent”) are found within the Accused Products.

The documents, identification of Accused Products, and other evidence cited in these charts are exemplary, and not intended to be exhaustive. Haptic’s identifications in these preliminary infringement contentions, including without limitation, its identifications of exemplary Asserted Claims, Accused Products, and the infringing features in the exemplary Accused Products, and/or the theories of infringement, are based upon information known to Haptic at the time of these preliminary infringement contentions. Haptic reserves the right to supplement and/or amend these preliminary infringement contentions based on information not known to Haptic at the time of service of its preliminary infringement contentions and/or that is otherwise later discovered by Haptic after service of its preliminary infringement contentions, including without limitation, supplementation and/or amendment of Haptic’s contentions to identify, refine, modify, amend, and/or supplement the identified Accused Products, locations of the infringing feature(s) in the Accused Products, and/or the theories of infringement provided herein.

These preliminary infringement contentions shall not limit Haptic’s right to assert any position it deems appropriate at any later date as to infringement, validity, claim construction, or any other issue in this litigation. Nor shall they be deemed an admission or contention as to the scope or interpretation of any claim term.

Haptic contends that Defendant Apple infringes the Asserted Claims of the Asserted Patent under 35 U.S.C. § 271(a) by making, using, offering to sell, and/or selling in the United States and/or importing into the United States at least the following iPhone models (“Accused Products”), either literally and/or under the doctrine of equivalents, as set out in Exhibits A and B: iPhone 8, iPhone 8 Plus, iPhone X, iPhone XS, iPhone XS Max, iPhone XR, iPhone 11, iPhone 11 Pro, iPhone 11 Pro Max, iPhone SE, iPhone SE2, iPhone SE3, iPhone 12, iPhone 12 Mini, iPhone 12 Pro, iPhone 12 Pro Max, iPhone 13, iPhone 13 Mini, iPhone 13 Pro, iPhone 13 Pro Max, iPhone 14, iPhone 14 Plus, iPhone 14 Pro, iPhone 14 Pro Max, iPhone 15, iPhone 15 Plus, iPhone 15 Pro, and iPhone 15 Pro Max.

Apple contributes to infringement of the Asserted Patent under 35 U.S.C. § 271(c) by providing the Accused Products within the United States, knowing that the products practice the claimed invention, that they are especially made or adapted for use in infringing the Asserted Patent, and that they are not staple articles or commodities of commerce capable of substantial non-infringing use. Apple’s infringement is further detailed in the Complaint (Dkt. 1), which is hereby incorporated by reference in its entirety

Haptic reserves the right to supplement its position as to infringement following further discovery and/or claim construction, including new information or knowledge regarding the structure, function, operation, implementation, and process of manufacturing the Accused Products.

These contentions are preliminary and are based on Haptic’s research and investigation to date and materials in the public domain. Discovery has not yet commenced. Defendant’s preliminary invalidity contentions have not yet been served. Claim construction proceedings have not yet commenced. Haptic reserves the right to supplement or amend these contentions in light

of discovery, invalidity contentions, alleged prior art, claim construction, and/or any other additional information provided by Defendant.

II. DISCLOSURE OF PRIORITY DATE

Haptic provides the following disclosure regarding the priority date for the Asserted Claims of the Asserted Patent. As an initial matter, Haptic notes that the Asserted Patent is subject to the First-to-File provisions of the America Invents Act (“AIA”). Haptic reserves the right to amend this disclosure should new information and knowledge regarding the conception, reduction to practice and/or priority dates of the Asserted Claims of the Asserted Patent come to light during discovery. Haptic further intends to rely on testimony by the inventors, experts, and other witnesses deposed in this matter concerning conception, diligence, and reduction to practice of the Asserted Claims of the Asserted Patent, including testimony at any hearing or the trial of this matter.

The priority date of the Asserted Patent is February 13, 2015. The Asserted Patent was assigned U.S. patent application number 15/043,283 upon filing on February 12, 2016 and issued on June 12, 2018 as U.S. Patent No. 9,996,738. The Asserted Patent claims the benefit of U.S. provisional application number 62/115,769, filed February 13, 2015.

The file histories for the above-referenced U.S. patent applications are being concurrently produced as follows:

Application Number	BATES Range
15/043,283 (the Asserted Patent)	HAPTIC_00000016–HAPTIC_00000203
62/115,769 (provisional application to the Asserted Patent)	HAPTIC_00000204–HAPTIC_00000261

Haptic reserves the right to supplement this production to the extent discovery or its investigations reveal additional documents.

Dated: March 18, 2024

Respectfully submitted,

SUSMAN GODFREY LLP

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COUNSEL FOR PLAINTIFF HAPTIC, INC.

CERTIFICATE OF SERVICE

The undersigned certifies that a true and correct copy of the above and foregoing document has been served on counsel of record via email on March 18, 2024.

/s/ Ace M. Factor

Ace M. Factor

EXHIBIT A

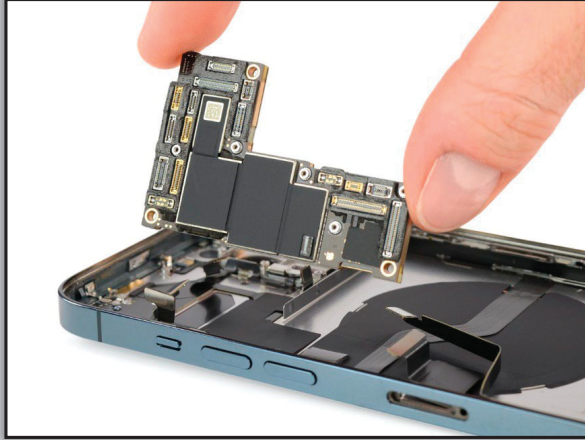
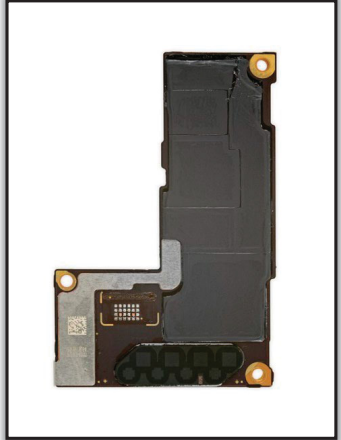
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Infringement of U.S. Patent No. 9,996,738

These claim charts show, on an element-by-element basis, how Apple Inc. (“Apple”) infringes Claims 1, 2, 4, 5, and 9 of U.S. Patent No. 9,996,738 (the “’738 Patent”) through the making, using, offering for sale, or sale in the United States, and/or importation into the United States, of various products and offerings that utilize the Back Tap feature, including each model of iPhone since the iPhone 8 series that supports Apple’s “Back Tap” feature, including at least the iPhone 8, 8 Plus, X, XS, XS Max, XR, 11, 11 Pro, 11 Pro Max, SE, SE2, SE3, 12, 12 Mini, 12 Pro, 12 Pro Max, 13, 13 Mini, 13 Pro, 13 Pro Max, 14, 14 Plus, 14 Pro, 14 Pro Max, 15, 15 Plus, 15 Pro, and 15 Pro Max models, as well as any other products that Apple makes, uses, offers for sale, monetizes, or sells in the United States, and/or imports into the United States that operate in the manner set forth below (collectively, the “Accused Products”). The claim chart below identifies infringement based on the exemplar iPhone 12 Pro Max. On information and belief, iPhone models 8, 8 Plus, X, XS, XS Max, XR, 11, 11 Pro, 11 Pro Max, SE, SE2, SE3, 12, 12 Mini, 12 Pro, 12 Pro Max, 13, 13 Mini, 13 Pro, 13 Pro Max, 14 Pro, and 14 Pro Max infringe the ’738 Patent in the same manner.

Haptic, Inc. (“Haptic”) further notes that this chart contains an exemplary, non-limiting description of Apple’s infringement that is representative of how each Accused Product infringes. Haptic further notes that it makes these contentions based on the information reasonably available to it at this time since discovery has not begun. Haptic thus reserves the right to modify, supplement, and/or amend these contentions as additional evidence and information become available, including in light of discovery, prior art, claim construction, or any other information provided by Apple or any other party or non-party to this action.

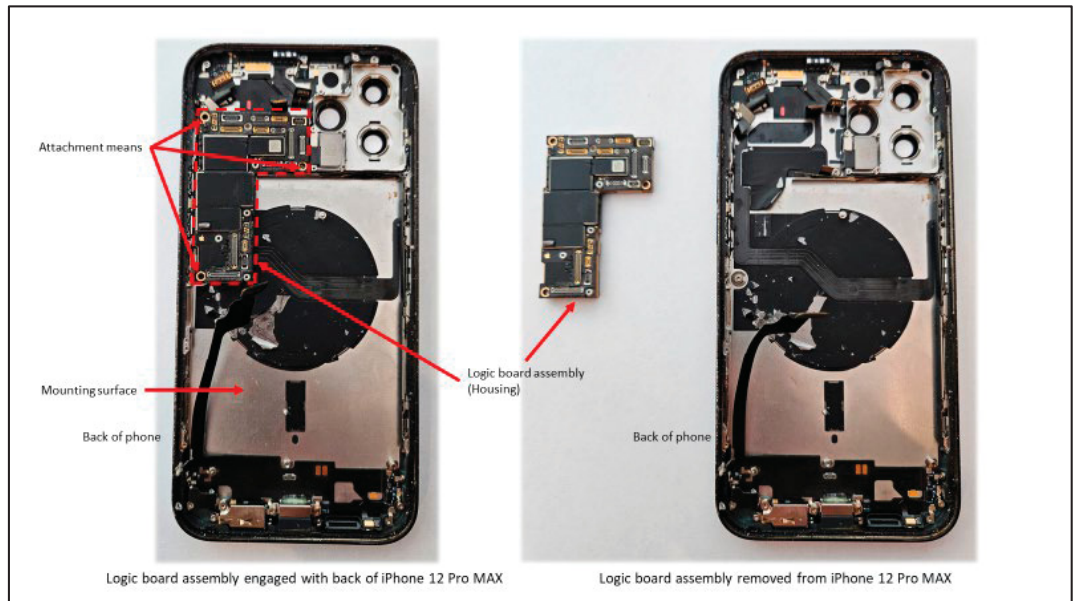
As demonstrated below, Haptic contends that each element of each asserted claim is literally infringed by the Accused Products. Haptic further contends that, to the extent that any particular element is not met literally by the Accused Products, each Accused Product infringes under the doctrine of equivalents for the reasons set forth below because there would be no substantial difference between the elements of the asserted claims and the corresponding functionality in the accused instrumentality, *i.e.*, the corresponding functionality in the Accused Products does substantially the same thing, in substantially the same way, to achieve substantially the same result(s) as the claimed elements.

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Claim 1	
[1.1] A control system comprising:	To the extent that the preamble is limiting, each Accused Product is a control system.
[1.2] a housing having an engagement means for a mounting surface;	Each Accused Product comprises “a housing having an engagement means for a mounting surface.”
[1.2.a] a “housing”	The “housing” comprises the logic board assembly that contains the sensor, any components of the logic board assembly (including at least the printed circuit board (PCB), the system on a chip (SoC), and other chips mounted on the logic board assembly), and any materials covering the logic board assembly. The images below show the housing of the exemplar iPhone 12 Pro Max:   Source: iFixit, iPhone 12 Pro Max Teardown, https://www.ifixit.com/Teardown/iPhone+12+Pro+Max+Teardown/138640
[1.2.b] having an “engagement means”	As discussed below at 1.16 and 1.17, the Accused Products have an “engagement means,” which comprises an attachment means between the housing and the mounting surface, and a transmission portion connecting the sensor to the attachment means of the housing.

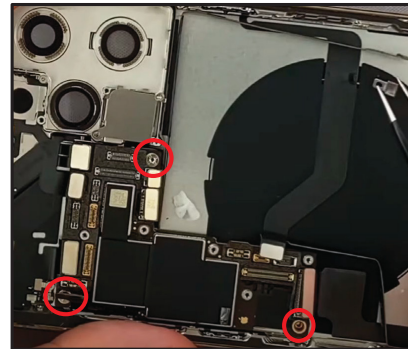
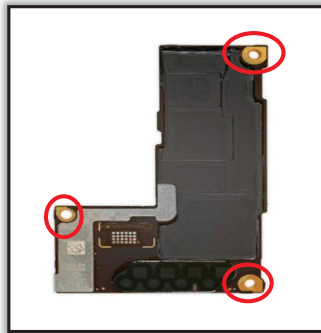
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In each of the Accused Products, the “attachment means” include at least the threaded screws and screw holes in the logic board assembly that attach the logic board assembly to the mounting surface. The attachment means can also be an adhesive, mechanical fasteners, threaded screws and the associated screw holes, or other components that hold the housing to the mounting surface, and any equivalents thereof.



In each of the Accused Products, the “attachment means” include at least the threaded screws and screw holes in the logic board assembly that attach the logic board assembly to the mounting surface:

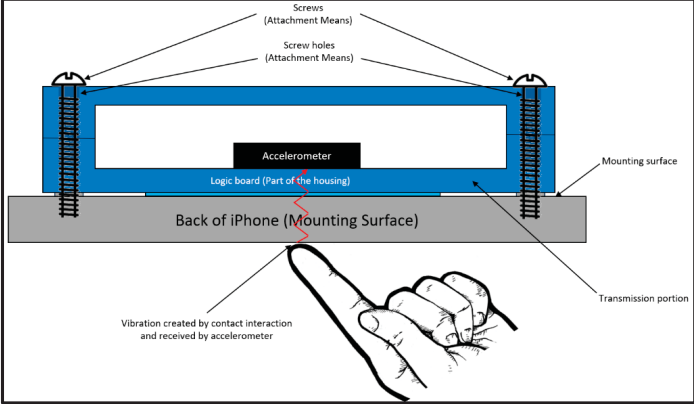
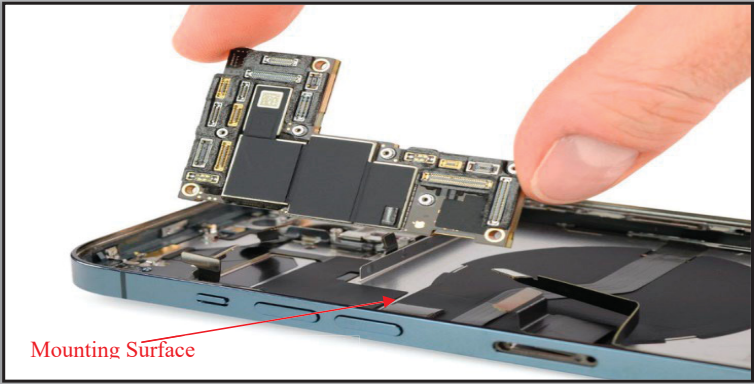
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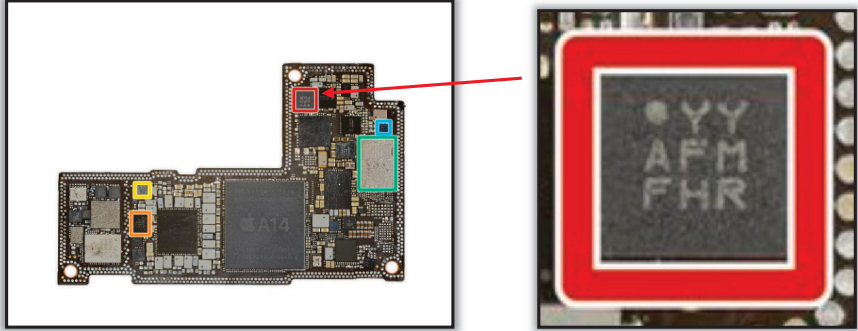
Source: iFixit, iPhone 12 Pro Max Teardown, <https://www.ifixit.com/Teardown/iPhone+12+Pro+Max+Teardown/138640>; How-FixIT, iPhone 12 Pro Max Teardown, <https://www.youtube.com/watch?v=hgsKhsSAMc> (annotated).

In each of the Accused Products, the “transmission portion connecting said sensor to said attachment means of said housing” is the portion of the logic board that connects the sensor to the attachment means (screws and screw holes). For example, as shown below in the simplified schematic illustration of the exemplar iPhone 12 Pro Max, the sensor (accelerometer, *see 1.3*) is connected to the attachment means (screws and screw holes, *see 1.16*) via a portion of the logic board. When the user taps on the back of the iPhone, a vibration is created and transmitted through the logic board to the sensor.

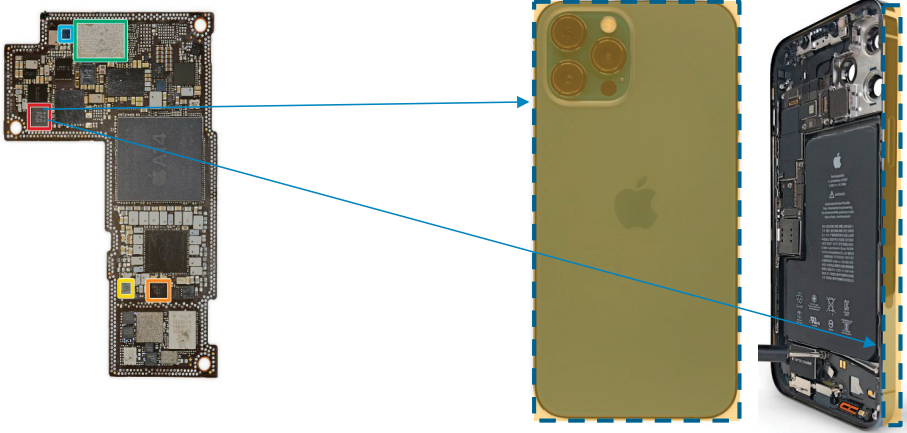
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	 The diagram illustrates the internal components of an iPhone housing. A blue rectangular frame represents the housing. Inside, a black rectangle is labeled 'Accelerometer'. Below the accelerometer is a grey rectangle labeled 'Logic board (Part of the housing)'. The entire assembly is mounted on a grey base labeled 'Back of iPhone (Mounting Surface)'. Two vertical screw holes are shown on the sides of the housing, each with a screw passing through it. Labels point to these screws and holes, stating 'Screws (Attachment Means)' and 'Screw holes (Attachment Means)'. A red wavy line connects the accelerometer to the logic board, labeled 'Transmission portion'. A hand is shown touching the back of the iPhone, with a label 'Vibration created by contact interaction and received by accelerometer' pointing to the contact point.
[1.2.c] for a “mounting surface”	The mounting surface is the part of the iPhone that engages with the housing:  The photograph shows the internal components of an iPhone 12 Pro Max being held by a hand. A red arrow points to a specific area on the back of the phone, labeled 'Mounting Surface'. Source: iFixit, iPhone 12 Pro Max Teardown, https://www.ifixit.com/Teardown/iPhone+12+Pro+Max+Teardown/138640

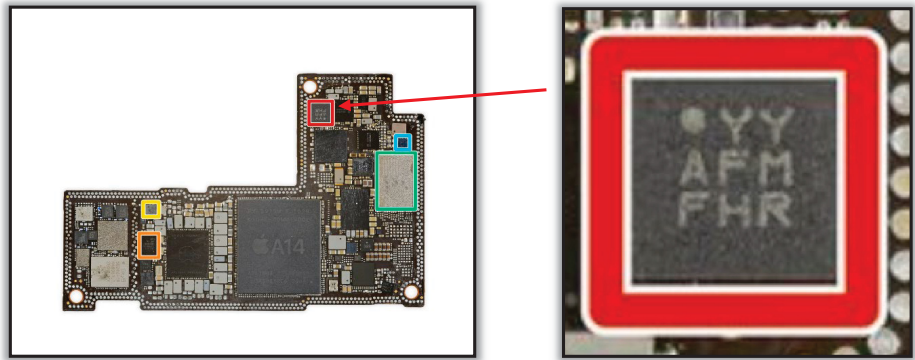
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[1.3] a “sensor” contained within said housing,	Each Accused Product has “a sensor contained within said housing.” The “sensor” comprises at least the accelerometer contained within the logic board assembly and/or any other sensors. In the iPhone 12 Pro Max, the sensor includes at least the component referred to as “IMU” and/or “U7300” and/or “BMI282AA.” The image below shows the sensor contained within the logic board assembly:  <i>Source:</i> iFixit, iPhone 12 Pro Max Teardown, https://www.ifixit.com/Teardown/iPhone+12+Pro+Max+Teardown/138640.
[1.4] said sensor forming an interactive zone defined by a range of said sensor,	Each Accused Product contains a “sensor forming an interactive zone defined by a range of said sensor.” The “interactive zone” includes the back side and/or the sides of the iPhone. Because the sensor (accelerometer) detects taps on the back side or sides of the iPhone to operate the Back Tap feature, the range of the sensor (accelerometer) defines the interactive zone:

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	 Source: iFixit, iPhone 12 Pro Max Teardown, https://www.ifixit.com/Teardown/iPhone+12+Pro+Max+Teardown/138640 (annotated).
[1.5] said sensor being comprised of an accelerometer,	In each Accused Product, the sensor is comprised of an accelerometer. The sensor comprises at least the accelerometer contained within the logic board assembly. In the iPhone 12 Pro Max, the sensor includes at least the component referred to as “IMU” (Inertial Measurement Unit) and/or “BMI282AA.” On information and belief, the sensor in the iPhone 12 Pro Max is a Bosch Sensortec IMU that includes accelerometer functionality. The image below shows the sensor (red box annotation) contained within the logic board assembly:

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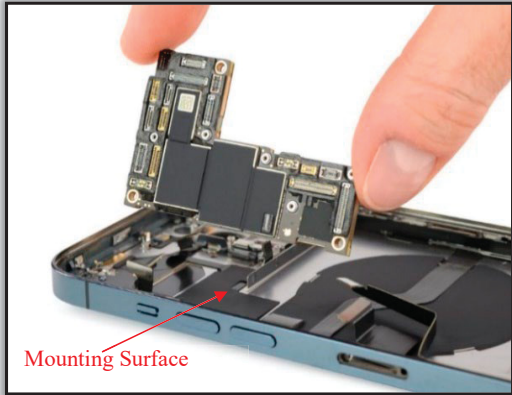


Source: iFixit, iPhone 12 Pro Max Teardown,
<https://www.ifixit.com/Teardown/iPhone+12+Pro+Max+Teardown/138640>.

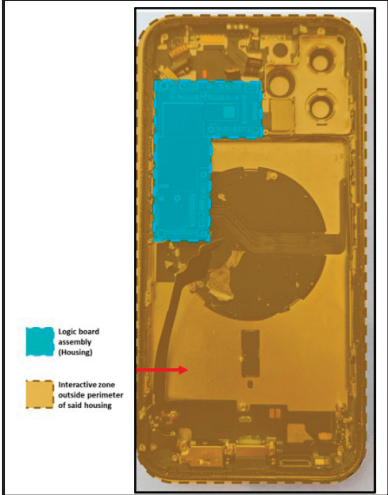
[1.6] said interactive zone being aligned with said mounting surface

Each Accused Product comprises “said interactive zone being aligned with said mounting surface.” The interactive zone includes the back side and/or sides of the iPhone (see 1.4). The “mounting surface” is the part of the iPhone that engages with the housing, as described above at 1.2.c. The “mounting surface” is aligned with the “interactive zone,” for example, on the back side or sides of the iPhone, where the interactive zone overlays the mounting surface:

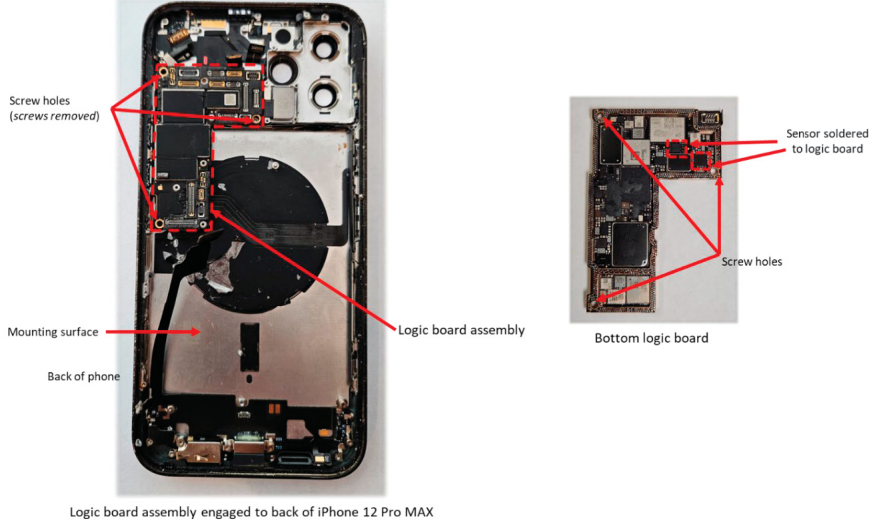
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	Mounting Surface	Interactive Zone
		
[1.7] and overlaying said mounting surface outside a perimeter of said housing,	Each Accused Product contains an interactive zone that is “overlaying said mounting surface outside a perimeter of said housing.” The interactive zone spans the back side and sides of the iPhone and overlays the mounting surface. Because the back side and sides of the iPhone is larger than the housing, the interactive zone is “outside a perimeter of said housing.” The Back Tap feature responds to taps anywhere on the back side or sides of the iPhone, including near the corners. The annotated image below shows how the interactive zone extends “outside a perimeter of said housing”:	

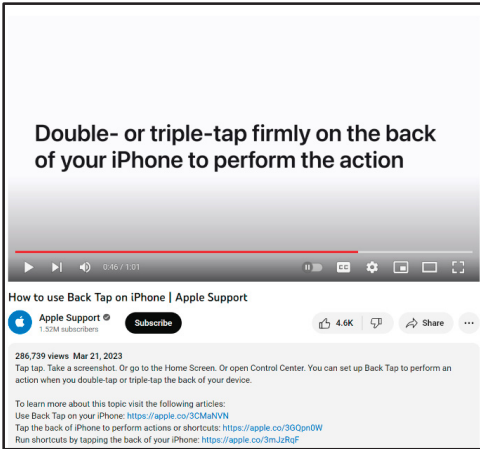
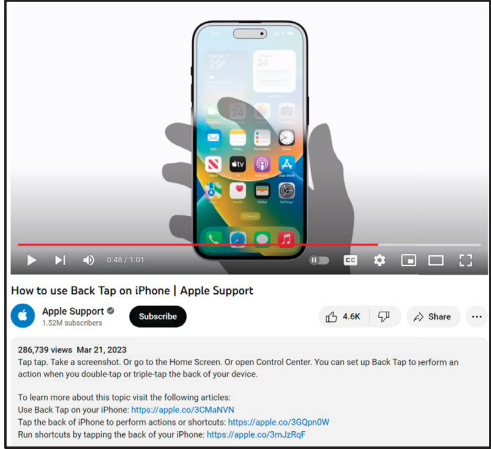
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[1.8] said sensor being in a fixed position relative to said engagement means, wherein a contact interaction associated with said mounting surface within said interactive zone is detected by said sensor as data signals,	Each Accused Product contains a “sensor being in a fixed position relative to said engagement means, wherein a contact interaction associated with said mounting surface within said interactive zone is detected by said sensor as data signals.” This element is discussed in further detail below at 1.8.a and 1.8.b.
[1.8.a] said sensor being in a fixed position relative to said engagement means,	In the exemplar image of the iPhone 12 Pro Max shown below, the engagement means include at least the attachment means (screws and screw holes, <i>see</i> 1.16) and a transmission portion connecting the sensor to the attachment means (<i>see</i> 1.17). In each of the Accused Products, the sensor (accelerometer, <i>see</i> 1.3) is soldered to the housing (logic board assembly). Because the sensor is fixed in place on the housing, the sensor (accelerometer) is “in a fixed position relative to” the engagement means:

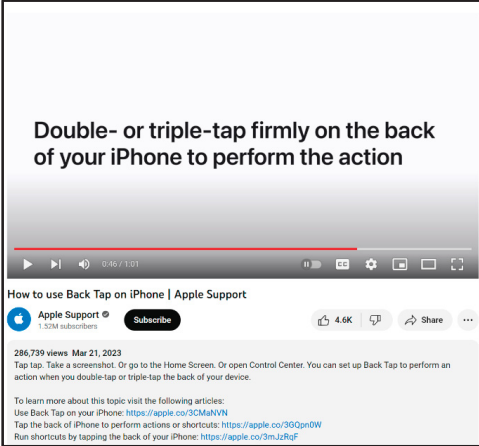
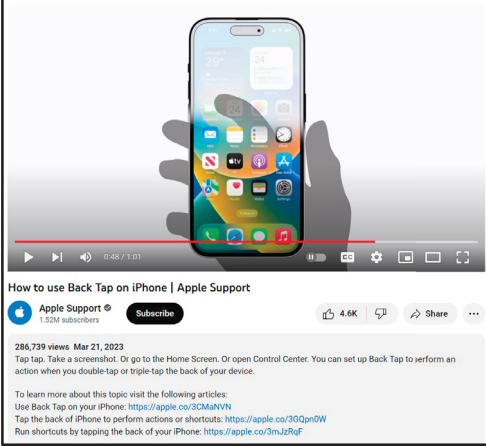
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	 Logic board assembly engaged to back of iPhone 12 Pro MAX	
[1.8.b] wherein a contact interaction associated with said mounting surface within said interactive zone is detected by said sensor as data signals,	In each of the Accused Products, the “contact interaction” consists of a double-tap or triple-tap on the back of the iPhone. Because the mounting surface is within the “interactive zone” of the back side and sides of the iPhone, the contact interaction on the back or sides of the iPhone impacts the mounting surface and is “associated with said mounting surface within said interactive zone.” The sensor (accelerometer) detects the contact interactions (taps) as data signals.	

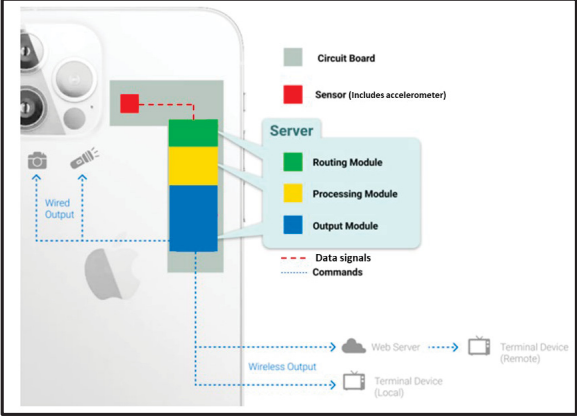
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	For instance, in its support videos, Apple explains that users can “double- or triple-tap firmly on the back of your iPhone,” which is detected by the sensor as data signals to use the Back Tap feature:   <i>Source: Apple Support, How to use Back Tap on iPhone, https://youtu.be/Z4ZeFJ65iXc.</i>
[1.9] said contact interaction being comprised of an impact on said mounting surface, said data signals being comprised of vibration data of said contact interaction;	Each Accused Product includes a “contact interaction being comprised of an impact on said mounting surface, said data signals being comprised of vibration data of said contact interaction.” In each of the Accused Products, double-taps and triple-taps on the back of the iPhone are contact interactions that impact the mounting surface. These contact interactions (taps) generate data signals that are comprised of vibrations. The contact interactions have certain characteristics that allow the vibrations to be identified as at least double-taps or triple-taps and that comprise “vibration data” that the sensor detects as “data signals.”

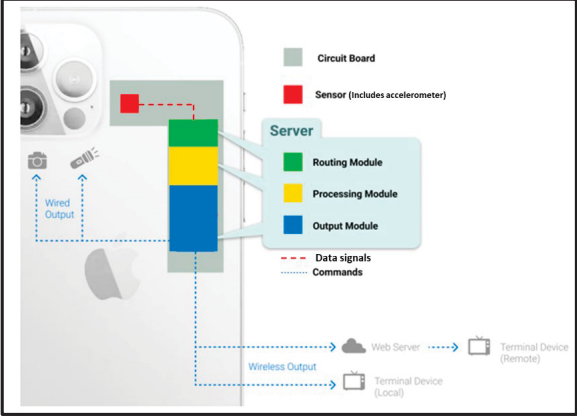
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	For instance, in its support videos, Apple explains that users can “double- or triple-tap firmly on the back of your iPhone,” which is detected by the sensor as data signals to use the Back Tap feature:   <i>Source: Apple Support, How to use Back Tap on iPhone, https://youtu.be/Z4ZeFJ65iXc.</i>
[1.10] a server in communication with said sensor,	Each Accused Product contains “a server in communication with said sensor.” As discussed in greater detail below, the sensor is in communication with other components on the logic board assembly, one or more of which comprises a server. The connection between the server and the sensor can be wireless or wired, and may also include a router, Wi-Fi, Bluetooth, or a local area network. The following simplified block diagram shows an exemplary configuration of a server in the Accused Products:

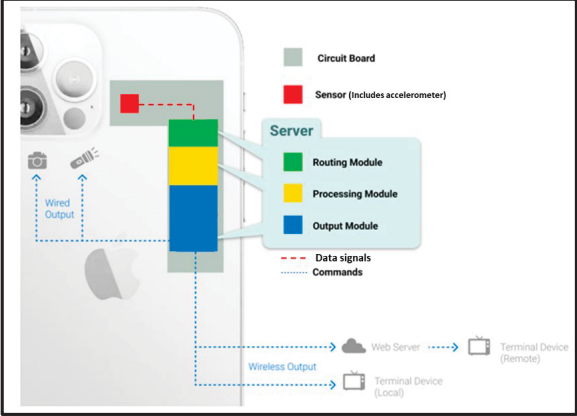
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[1.11] said server being comprised of a routing module, a processing module being connected to said routing module, and an output module connected to said processing module,	Each Accused Product contains a “server being comprised of a routing module, a processing module being connected to said routing module, and an output module connected to said processing module.” The following simplified block diagram shows an exemplary configuration of a server in the Accused Products, where the server includes a routing module, a processing module, and an output module:

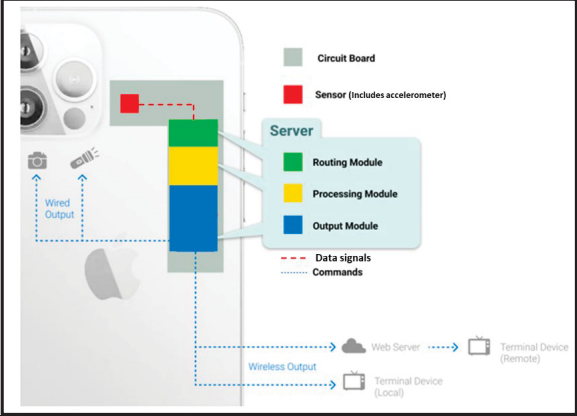
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[1.11.a] said server being comprised of a “routing module,”	In each of the Accused Products, the “routing module” receives data signals from the sensor. The routing module comprises at least the circuitry that forms the path from the sensor to the processing module, as well as any intermediate registers, level translators, connectors, interfaces, or logic for connecting the sensor to the processing module. In the iPhone 12 Pro Max, the routing modules include the outbound connections from the sensor to the processing module. The following simplified block diagram shows an exemplary configuration of a server in the Accused Products, where the server includes a routing module:

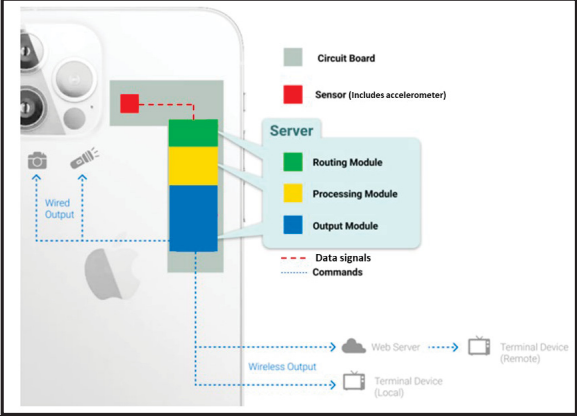
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[1.11.b] a “processing module” being connected to said routing module,	In each of the Accused Products, the “processing module” determines the data pattern corresponding to the data signals and includes at least the application processor (“SOC”) of the iPhone and/or the integrated motion coprocessor within the application processor. In the exemplar iPhone 12 Pro Max, the processing module is referred to as “A14,” “Sicily,” “APL1W01,” “SOC,” “AOP,” or “U1000.” The following simplified block diagram shows an exemplary configuration of a server in the Accused Products, where the server includes a processing module connected to a routing module:	

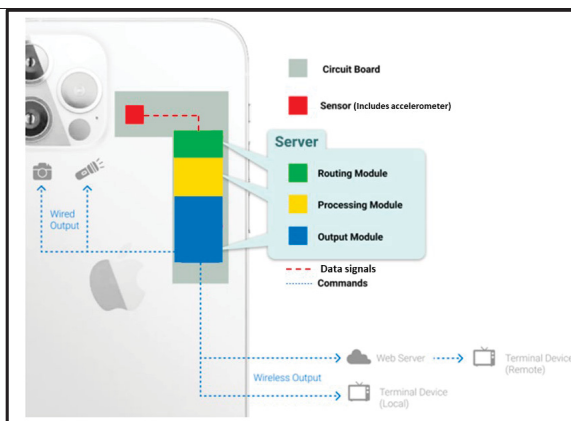
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[1.11.c] and an “output module” connected to said processing module.	The “output module” is connected to the processing module and transmits commands to a receiving module in a terminal device. In the Accused Products, the “output module” comprises the circuitry that forms the path from the processing module to the receiving module in a terminal device, as well as any intermediate registers, interfaces, level translators, connectors, interfaces, or logic for connecting the processing module to the receiving module in a terminal device.” The following simplified block diagram shows an exemplary configuration of a server in the Accused Products, where the server includes an output module connected to a processing module:	

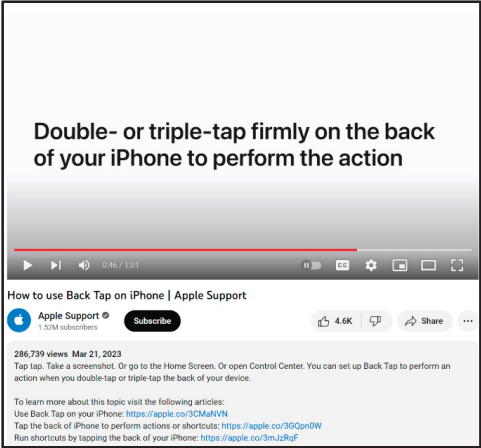
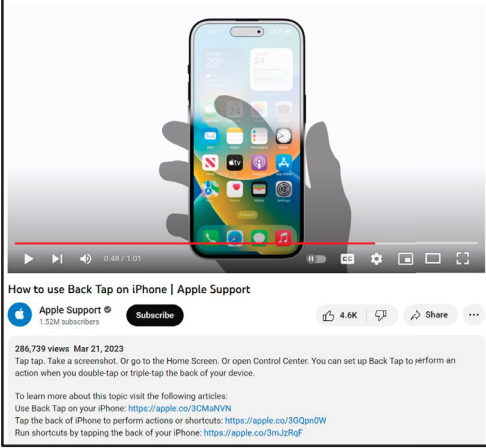
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[1.12] said routing module receiving said data signals from said sensor, said processing module determining a data pattern corresponding to said data signals of said contact interaction and matching said data pattern with a gesture profile,	Each Accused Product contains a “routing module receiving said data signals from said sensor, said processing module determining a data pattern corresponding to said data signals of said contact interaction and matching said data pattern with a gesture profile.” In each of the Accused Products, the accelerometer outputs are the “data signals.” The routing module receives those data signals from the sensor, and the processing module receives those data signals from the routing module. The processing module then determines whether the data signals represent a “data pattern” that corresponds to a matching gesture profile (including at least either a “Double Tap” or a “Triple Tap” gesture profile). The following simplified block diagram shows an exemplary configuration of a server in the Accused Products, where the server includes a routing module receiving data signals from a sensor, and a processing module determining a data pattern corresponding to data signals of a contact interaction and matching with a gesture profile:	

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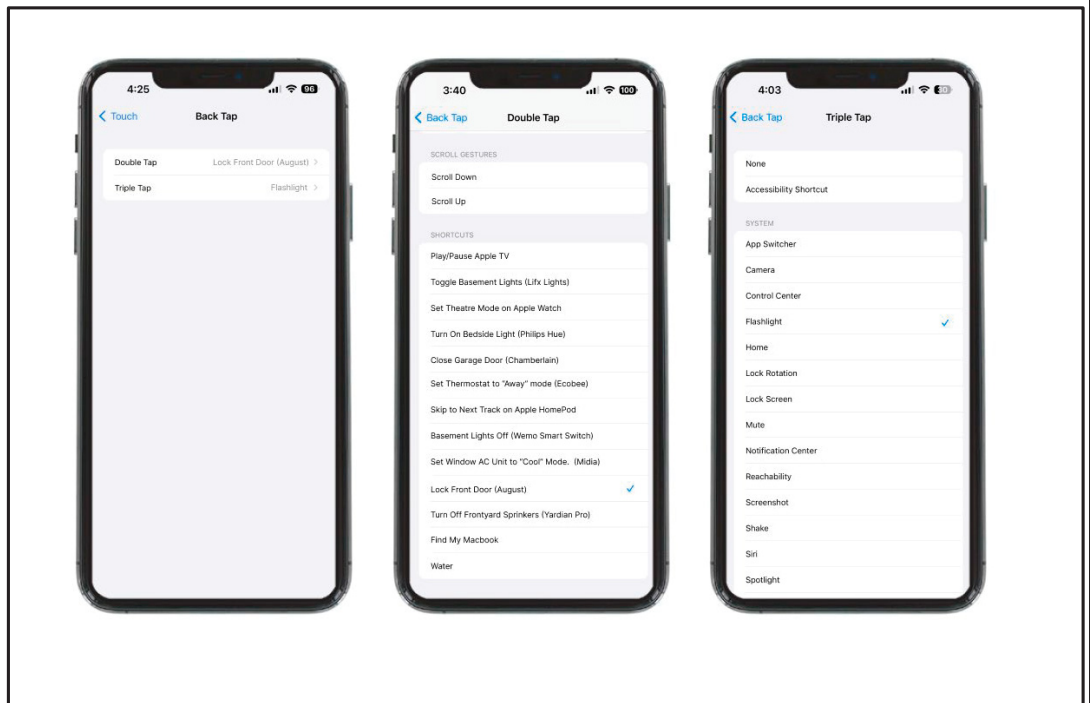


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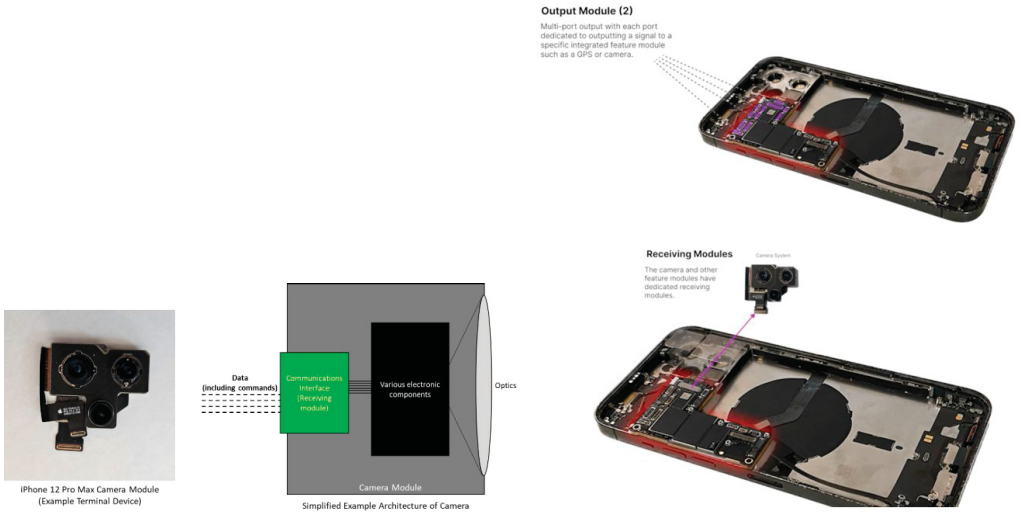
	Apple explains that users can “double- or triple-tap firmly on the back of your iPhone” to use the Back Tap feature, as the processing module determines a data pattern corresponding to said data signals of said contact interaction and matches said data pattern with a gesture profile, such as a double tap gesture or a triple tap gesture:   <i>Source:</i> Apple Support, <i>How to use Back Tap on iPhone</i>, https://youtu.be/Z4ZeFJ65iXc.
[1.13] said gesture profile being associated with a command; and	In each of the Accused Products, a “gesture profile” is “associated with a command.” The command associated with the gesture profile relates to the particular terminal device. As discussed below at 1.14, gestures can be associated with commands in terminal devices internal to the iPhone and/or terminal devices external to the iPhone. In the Accused Products, iPhone users can assign a command from a pre-configured list to either the Double Tap or the Triple Tap gesture profile. There are over 40 available commands, including “system,” “accessibility,” “scroll gestures,” and “shortcuts” commands that users can associate with the Double Tap or the Triple Tap gesture profile. Back Tap also automatically includes any user-created “shortcuts” commands within its list of available commands. For example, the double-tap or triple-tap gesture can be associated with at least the following exemplary commands: lower the temperature of a thermostat, turn on/off an external

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light or lamp, open or switch applications on the iPhone, open an online calendar software program, activate the iPhone camera, turn on/off the iPhone flashlight, activate Siri, play/pause Apple TV, Apple Watch Mirroring, Assistive Touch, take a screenshot, “Control Nearby Devices,” lock the iPhone screen, turn the iPhone volume up or down, mute, scroll up and down, open specified applications, or engage the “Shortcuts” feature:



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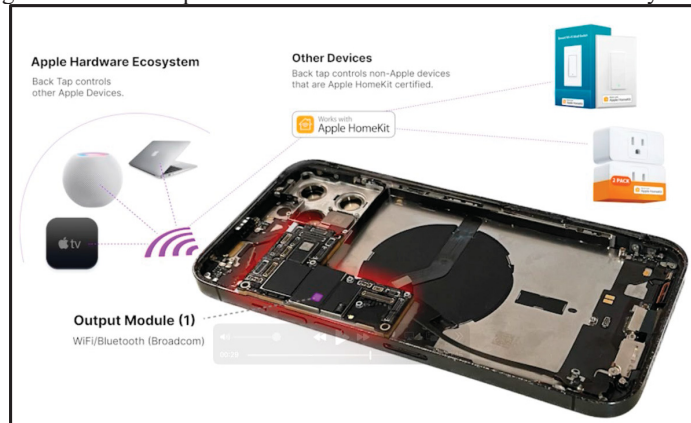
[1.14] a terminal device being comprised of a receiving module and	Each Accused Product contains and/or interacts with a “terminal device being comprised of a receiving module.” More than one terminal device can be connected to the server, and the control system can also be used with multiple terminal devices. In each of the Accused Products, gestures can be associated with independent terminal devices internal to the iPhone and/or independent terminal devices external to the iPhone. Examples of terminal devices comprised of a receiving module internal to the iPhone include at least the iPhone’s camera, flashlight, speaker, lock controls, audio player, volume up, volume down, smartphone GUI (Lock Screen command), mute control, the screen, and other internal iPhone functions. These internal terminal devices contain receiving modules and have associated integrated electronics to receive commands from the output module. The image below illustrates one example of an internal terminal device and its corresponding receiving module:  Output Module (2) Multi-port output with each port dedicated to outputting a signal to a specific integrated feature module such as a GPS or camera. Receiving Modules The camera and other feature modules have dedicated receiving modules. iPhone 12 Pro Max Camera Module (Example Terminal Device) Simplified Example Architecture of Camera
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In the Accused Products, Double Tap and Triple Tap gestures can also be associated with terminal devices external to the iPhone through the “Shortcuts” and “Control Nearby Devices” features. Examples of terminal devices external to the iPhone include, but are not limited to, appliances (e.g., televisions, stereos, or coffee machines), lights with switches, devices running software, computers, laptops, tablets, smartphones, televisions, external lights or lighting fixtures, climate regulators, thermostats, or fans.

For example, the “Control Nearby Devices” command can be associated with terminal devices on the same local area network as the Accused Products, including Apple Watches, iPads, other iPhones, Apple TVs, Apple HomePods, Apple MacBook Laptops, third-party devices, and other HomeKit-compatible devices. All these terminal devices controllable via Back Tap receive commands at receiving modules from the Accused Products’ output modules. For terminal devices external to the Accused Products that are outside the Accused Products’ local area network, the Accused Products use Back Tap to activate and control those terminal devices through the Apple “Shortcuts” feature and the Apple “Home” application, which are integrated into Back Tap. For example, a user can create a shortcut that turns on or off all the lights in a home, and use the Back Tap feature to assign that command to either the double-tap or triple-tap gesture.

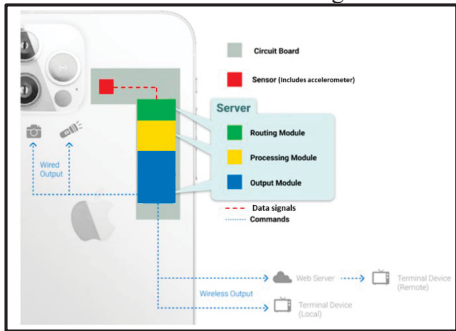
The following image identifies examples of external terminal devices controllable by Back Tap:



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	All shortcuts, including those associated with the Apple HomeKit-compatible smart-home devices owned by the user, are automatically listed in the Back Tap interface, can be configured and controlled by Back Tap, and are listed within the Shortcuts application of the iPhone: <i>Source:</i> https://christianboyce.com/ios_backtap/
[1.15] and means for initiating activity of said terminal device corresponding to said command, said terminal device being in	Each Accused Product includes a terminal device comprising a receiving module and “means for initiating activity of said terminal device corresponding to said command, said terminal device being in communication with said server, said output module transmitting said command to said receiving module.”

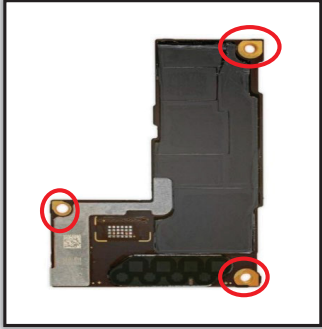
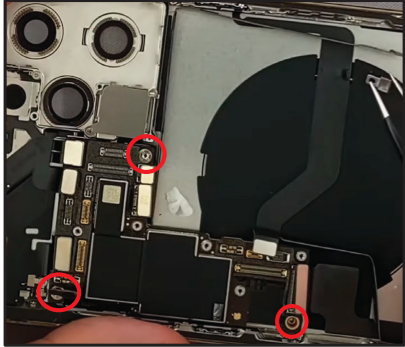
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communication with said server, said output module transmitting said command to said receiving module,	In each of the Accused Products, the “means for initiating activity” of those terminal devices are the switches, transistors, physical actuators, other actuating mechanisms, and equivalents thereof for changing the status of a terminal device. The terminal device executing a command may be internal or external to the iPhone (<i>see</i> 1.13 and 1.14). For terminal devices internal to the iPhone, the “means for initiating activity” is the switch, transistor, physical actuator, or other actuating mechanism that activates the terminal device, e.g., the connection that activates the iPhone’s flashlight. For other terminal devices (e.g. alarm clock, Siri, cellular telephone, etc.) internal to the iPhone, they are actuated by a switch or other actuating mechanism that may be a switch hardware component, a switch component comprising a general or applications processor and programming, another type of actuating mechanism comprising a processor (e.g. general, applications, cellular baseband, graphics, global positioning system, etc.) and programming, or another actuating mechanism to change the status (e.g. on/off, raise/lowering, push/pull requests, etc.) of a terminal device. For terminal devices external to the Accused Products, such as other iPhones, iPads, Apple TVs, Apple Watches, Apple HomePods, Apple MacBook Laptops, third-party devices, and other HomeKit-compatible modules, the “means for initiating activity” are the switches, transistors, physical actuators, other actuating mechanisms, and equivalents thereof that initiate the activity corresponding to the command communicated by the output module of the Accused Products. In each of the Accused Products, the terminal device is in communication with the server, and the output module transmits the command to the terminal device’s receiving module: 
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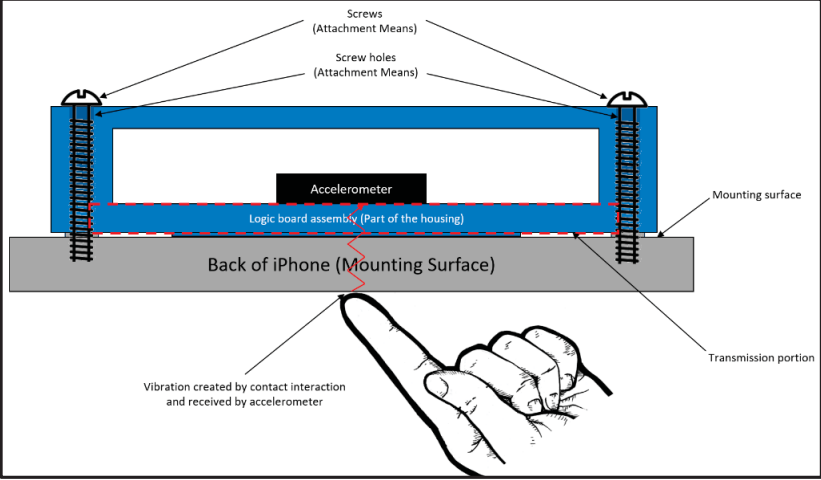
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	For example, HomeKit compatible devices can be controlled via a shortcut. The shortcut can be controlled via Back Tap (see 1.14). See https://support.apple.com/guide/shortcuts/create-a-new-home-automation-apd2a290f633/ios (explaining how to convert an automation into a shortcut). The diagram shows a central smartphone with its back cover removed, revealing internal components. A label 'Output Module (1)' points to a component on the logic board, with a sub-label 'WiFi/Bluetooth (Broadcom)'. To the left, under 'Apple Hardware Ecosystem', are icons for an Apple Watch, a MacBook, and an Apple TV, with a note 'Back Tap controls other Apple Devices'. To the right, under 'Other Devices', are icons for a smart light bulb, a smart plug, and a smart speaker, with a note 'Back tap controls non-Apple devices that are Apple HomeKit certified.' A central 'Apple HomeKit' logo is also present. In each of the Accused Products, the terminal device is in communication with the server, and the output module transmits the command to the terminal device's receiving module (see 1.11c and 1.13).
[1.16] wherein said engagement means of said housing comprises: an attachment means between said housing to said mounting surface; and	Each Accused Product contains an engagement means that comprises “an attachment means between said housing to said mounting surface.” In each of the Accused Products, the “attachment means” include at least the threaded screws and screw holes in the logic board assembly that attach the logic board assembly to the mounting surface. The attachment means can also be an adhesive, mechanical fasteners, threaded screws and the associated screw holes, or other components that hold the housing to the mounting surface, and any equivalents thereof. In each of the Accused Products, the “attachment means” include at least the threaded screws and screw holes in the logic board assembly that attach the logic board assembly to the mounting surface:

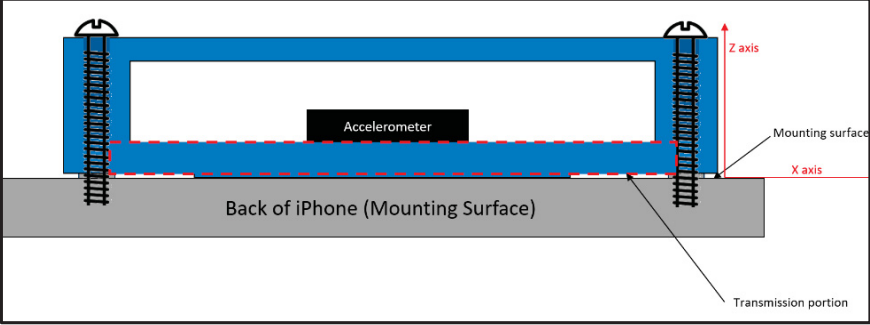
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	  How-FixIT, <i>iPhone 12 Pro Max Teardown</i>, https://www.youtube.com/watch?v=hgsKhsSAMc (annotated).
[1.17] and a transmission portion connecting said sensor to said attachment means of said housing	Each Accused Product contains an engagement means that comprises an attachment means between said housing to said mounting surface and “a transmission portion connecting said sensor to said attachment means of said housing.” In each of the Accused Products, the “transmission portion connecting said sensor to said attachment means of said housing” is the portion of the logic board that connects the sensor to the attachment means (screws and screw holes). For example, as shown below in the simplified schematic illustration of the exemplar iPhone 12 Pro Max, the sensor (accelerometer, <i>see</i> 1.3) is connected to the attachment means (screws and screw holes, <i>see</i> 1.16) via a portion of the logic board. When the user taps on the back of the iPhone, a vibration is created and transmitted through the logic board to the sensor.

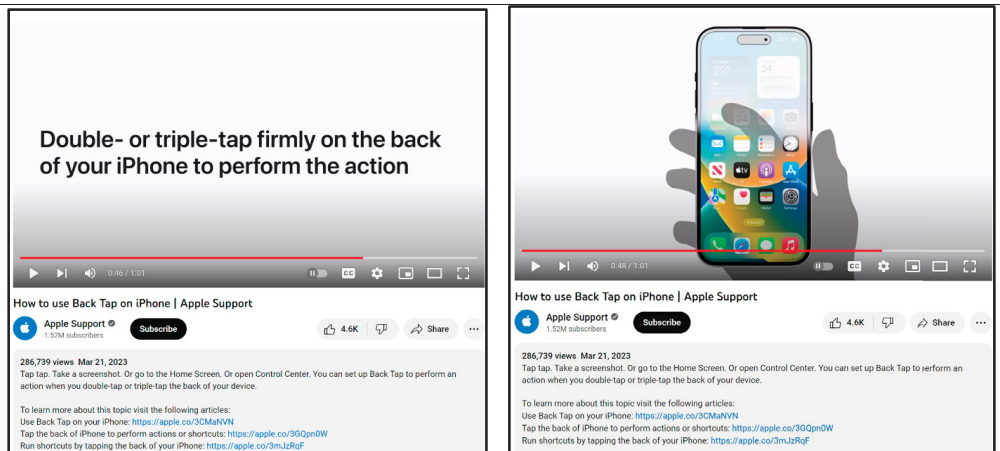
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[1.18] and being comprised of a material with flexibility different than said mounting surface so as to set a rigid position of said sensor relative to said mounting surface,	Each Accused Product contains an engagement means that comprises an attachment means and a transmission portion that is “comprised of a material with flexibility different than said mounting surface so as to set a rigid position of said sensor relative to said mounting surface.” For example, in the exemplar iPhone 12 Pro Max, the transmission portion (part of the logic board) appears to be made of FR-4 or similar material. FR-4 is a glass epoxy composite material. The mounting surface of the iPhone 12 Pro Max, in contrast, is made, at least in part, of metal. On information and belief, the metal on the back of the iPhone is one or more of titanium, stainless steel, or aluminum (depending on the model of iPhone). Each of these metals has a different flexibility than FR-4. In material science, Youngs modulus is a property that describes the stiffness of a particular material. Stiffness is the inverse of flexibility, so if two materials have different Youngs modulus values, they will have different flexibilities. FR-4 typically has a Youngs modulus in the range of 0.6 to 2.6 GPa. Titanium, stainless steel, and aluminum have Youngs modulus values of approximately 116, 193, and 68 GPa respectively.

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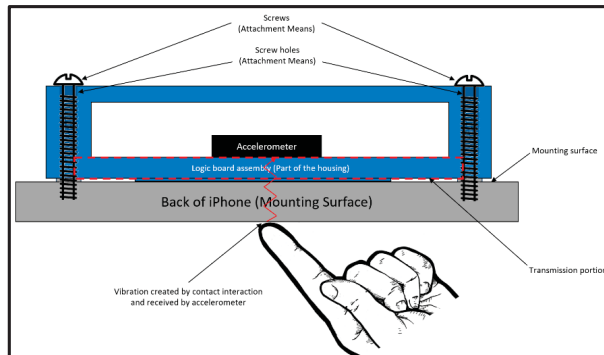
	The image below shows a simplified two-dimensional representation of a cross-sectional portion of the exemplar iPhone 12 Pro Max. The X, Y (not shown), and Z axes are associated with the mounting surface. The accelerometer is soldered to the transmission portion (part of the logic board), which is rigid and attached to the mounting surface by the screws and screw holes. The accelerometer does not move along the X, Y, or Z axes relative to the mounting surface. Therefore, the sensor's position is rigid relative to the mounting surface. 
[1.19] said contact interaction generating said data signals of said sensor through said transmission portion.	Each Accused Product comprises “said contact interaction generating said data signals of said sensor through said transmission portion.” In each of the Accused Products, the contact interaction (taps on back of the iPhone) generate data signals that are transmitted to the sensor (accelerometer) through the transmission portion (part of the logic board). <i>See</i> 1.8 and 1.17. For instance, Apple explains that users can “double- or triple-tap firmly on the back of your iPhone,” and the contact interaction from the double- or triple-tap generates, through the transmission portion, is detected by the sensor as data signals to use the Back Tap feature:

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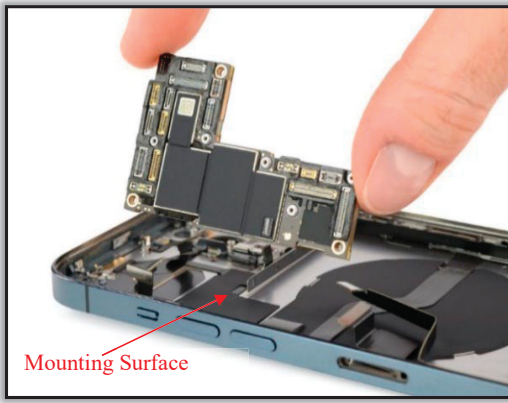
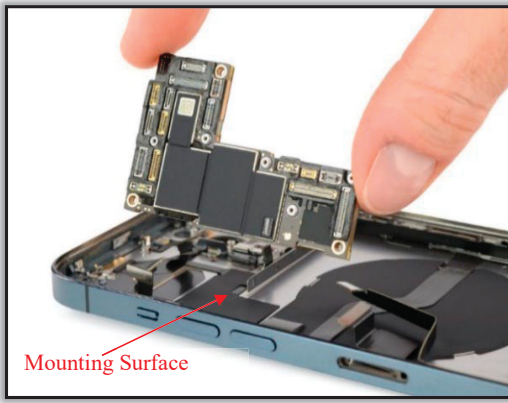
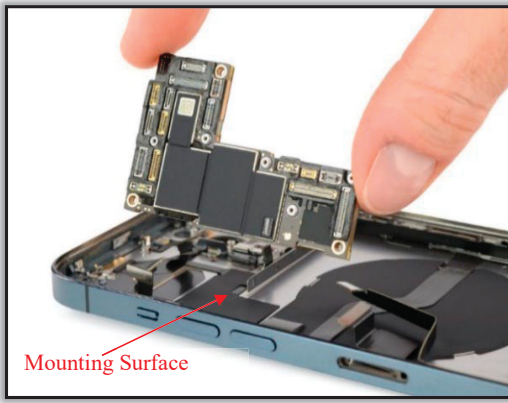


Source: Apple Support, *How to use Back Tap on iPhone*, <https://youtu.be/Z4ZeFJ65iXc>.

As further illustration, when the user taps on the back of the iPhone, a vibration is created and transmitted through the logic board to the sensor:



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Claim 2					
[2] The control system, according to claim 1, wherein said interactive zone of said sensor aligns with said mounting surface, said interactive zone being coplanar with said mounting surface.	Each Accused Product comprises a control system according to Claim 1 “wherein said interactive zone of said sensor aligns with said mounting surface, said interactive zone being coplanar with said mounting surface.” In the Accused Products, the “mounting surface” is aligned with the “interactive zone,” for instance, on the back side or sides of the iPhone where the interactive zone overlays the mounting surface. Further, because the interactive zone includes the back side and the sides of the iPhone, the interactive zone is also aligned with and is coplanar with the mounting surface:				
	<table border="1"> <thead> <tr> <th data-bbox="511 814 1040 846">Mounting Surface</th><th data-bbox="1040 814 1575 846">Interactive Zone</th></tr> </thead> <tbody> <tr> <td data-bbox="511 846 1040 1274">  </td><td data-bbox="1040 846 1575 1274">  </td></tr> </tbody> </table>	Mounting Surface	Interactive Zone		
Mounting Surface	Interactive Zone				
					
Claim 4					
[4] The control system, according to claim 1, wherein said contact interaction is comprised of an impact on said mounting surface, said data signals having a respective defined peak corresponding to each impact, a defined time period after a last defined peak, said data pattern being comprised of each defined peak and said defined time period after said last defined peak.”	The peak amplitude point of each vibration is used as it would be arbitrary to use any other time sample from the impacts. Furthermore, it is evident that the time between the impacts is used for the data pattern because				

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defined time period after a last defined peak, said data pattern being comprised of each defined peak and said defined time period after said last defined peak.	a triple tap is not recognized by the iPhone's Back Tap feature unless the time period between the first and second vibration has minimal variation from the time period between the second and third vibration. For double taps, there is only one time period between impacts so there is merely a maximum and minimum allowed time period between impacts of a double tap. This is evident by the fact that both extremely fast and extremely slow double taps are ignored.
Claim 5	
[5] The control system, according to claim 1, wherein said contact interaction is comprised of a plurality of impacts on said mounting surface, said data signals having a respective defined peak corresponding to each impact, a measured time period between each defined peak, and a defined time period after a last defined peak, said data pattern being comprised of each defined peak, each measured time period, and said defined time period after said last defined peak.	Each Accused Product comprises, "wherein said contact interaction is comprised of a plurality of impacts on said mounting surface, said data signals having a respective defined peak corresponding to each impact, a measured time period between each defined peak, and a defined time period after a last defined peak, said data pattern being comprised of each defined peak, each measured time period, and said defined time period after said last defined peak." Apple's Back Tap feature detects gestures comprised of a plurality of impacts on the mounting surface, and as explained above with respect to Claim 4 , the respective peaks and time periods are used to help decipher the gestures.
Claim 9	
[9] The control system, according to claim 1, further comprising: an additional terminal device being comprised of an additional receiving module and additional means for initiating activity of said additional terminal device corresponding to an additional	Each Accused Product comprises, "an additional terminal device being comprised of an additional receiving module and additional means for initiating activity of said additional terminal device corresponding to an additional command, said additional terminal device being in communication with said server, said output module transmitting said additional command to said additional receiving module." Apple TV and Apple Home Pod are examples of terminal devices with a receiving module and additional means for initiating activity of other terminal devices. Both Apple TV and Apple Home Pods function as Apple "Home Hubs," which can receive commands from the output module of the iPhone and then relay commands to other terminal devices that are HomeKit compatible. The "additional means for initiating

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command, said additional terminal device being in communication with said server, said output module transmitting said additional command to said additional receiving module.	activity” are the switches, transistors, physical actuators, other actuating mechanisms, and equivalents thereof that initiate the activity corresponding to the additional command communicated by the output module of the Accused Products and equivalents thereof.
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EXHIBIT B

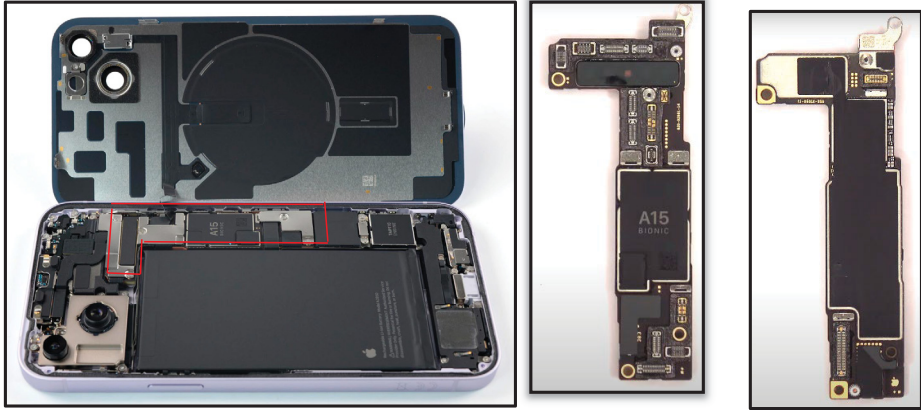
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These claim charts show, on an element-by-element basis, how Apple Inc. (“Apple”) infringes Claims 1, 2, 4, 5, and 9 of U.S. Patent No. 9,996,738 (the “’738 Patent”) through the making, using, offering for sale, or sale in the United States, and/or importation into the United States, of various products and offerings that utilize the Back Tap feature, including each model of iPhone since the iPhone 8 series that supports Apple’s “Back Tap” feature, including at least the iPhone 8, 8 Plus, X, XS, XS Max, XR, 11, 11 Pro, 11 Pro Max, SE, SE2, SE3, 12, 12 Mini, 12 Pro, 12 Pro Max, 13, 13 Mini, 13 Pro, 13 Pro Max, 14, 14 Plus, 14 Pro, 14 Pro Max, 15, 15 Plus, 15 Pro, and 15 Pro Max models, as well as any other products that Apple makes, uses, offers for sale, monetizes, or sells in the United States, and/or imports into the United States that operate in the manner set forth below (collectively, the “Accused Products”). The claim chart below identifies infringement based on the exemplar iPhone 14 Plus. On information and belief, iPhone models 14, 14 Plus, 15, 15 Plus, 15 Pro, and 15 Pro Max infringe the ’738 Patent in the same manner.

Haptic, Inc. (“Haptic”) further notes that this chart contains an exemplary, non-limiting description of Apple’s infringement that is representative of how each Accused Product infringes. Haptic further notes that it makes these contentions based on the information reasonably available to it at this time since discovery has not begun. Haptic thus reserves the right to modify, supplement, and/or amend these contentions as additional evidence and information become available, including in light of discovery, prior art, claim construction, or any other information provided by Apple or any other party or non-party to this action.

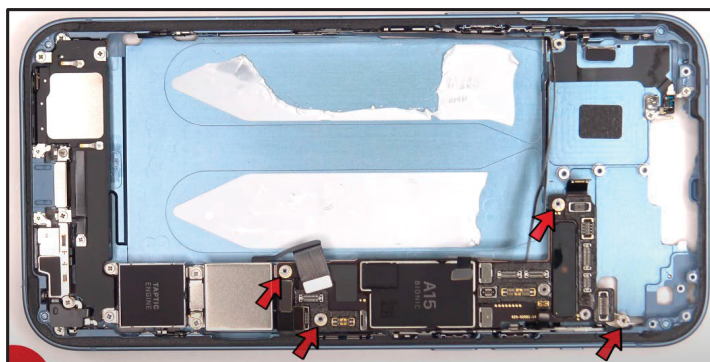
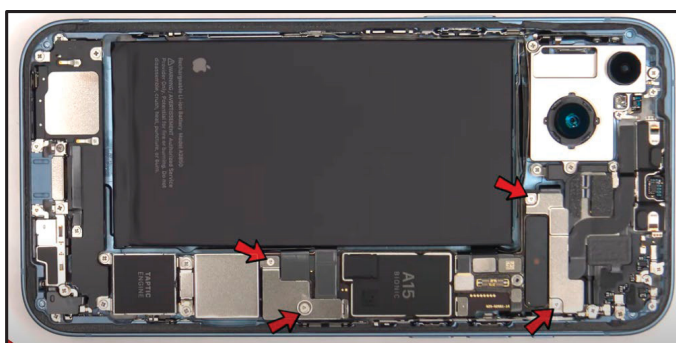
As demonstrated below, Haptic contends that each element of each asserted claim is literally infringed by the Accused Products. Haptic further contends that, to the extent that any particular element is not met literally by the Accused Products, each Accused Product infringes under the doctrine of equivalents for the reasons set forth below because there would be no substantial difference between the elements of the asserted claims and the corresponding functionality in the accused instrumentality, *i.e.*, the corresponding functionality in the Accused Products does substantially the same thing, in substantially the same way, to achieve substantially the same result(s) as the claimed elements.

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Claim 1	
[1.1] A control system comprising:	To the extent that the preamble is limiting, each Accused Product is a control system.
[1.2] a housing having an engagement means for a mounting surface;	Each Accused Product comprises “a housing having an engagement means for a mounting surface.”
[1.2.a] a “housing”	The “housing” comprises the logic board assembly that contains the sensor (see 1.3), any components of the logic board assembly (including at least the printed circuit board (PCB), the system on a chip (SoC), and other chips mounted on the logic board assembly), and any materials covering the logic board assembly. The images below show the housing of the exemplar iPhone 14 Plus:  <i>Source:</i> iPhone 14 Plus Teardown, https://www.ifixit.com/News/66394/the-iphone-14-plus-is-more-repairable-too (annotated).
[1.2.b] having an “engagement means”	Each Accused Product contains an “engagement means” which, as discussed further at 1.16 below, comprises an attachment means between said housing and said mounting surface. In each of the Accused Products, the attachment means includes at least the threaded screws and screw holes in the logic board assembly that attach the logic board assembly to the mounting surface. The attachment

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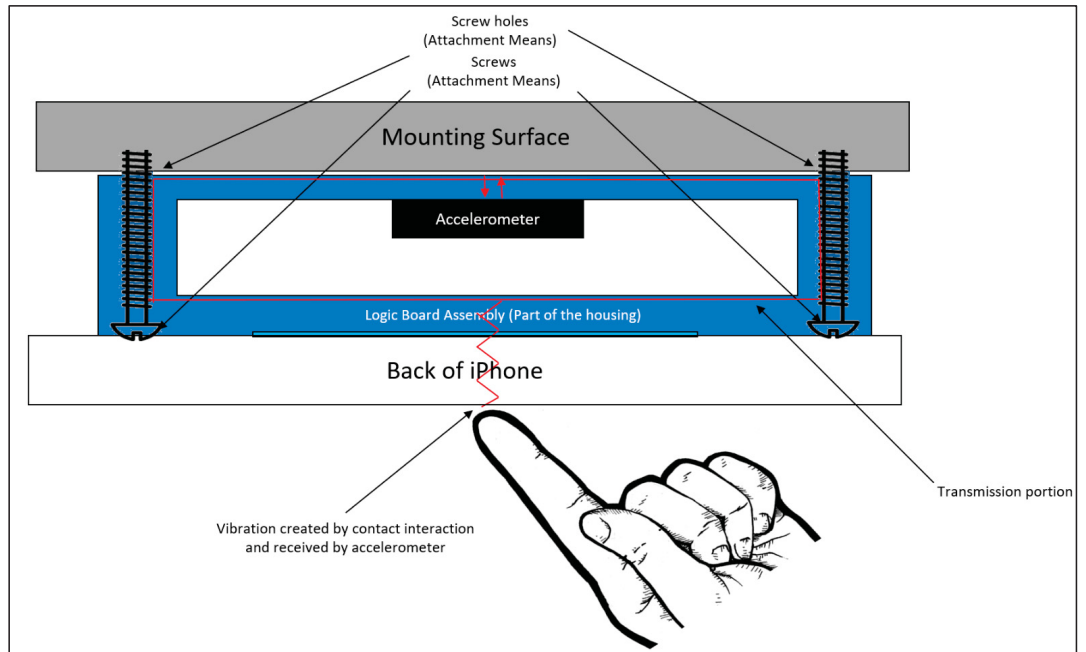
means can also include an adhesive, mechanical fasteners, threaded screws, and the associated screw holes, or other components that hold the housing to the mounting surface, and any equivalents thereof.



Source: PBKreviews, *Apple iPhone 14 Plus Disassembly Teardown Repair Video*, https://www.youtube.com/watch?v=QlkC6_AiinU; <https://www.youtube.com/watch?v=TNWOROMpmsk>.

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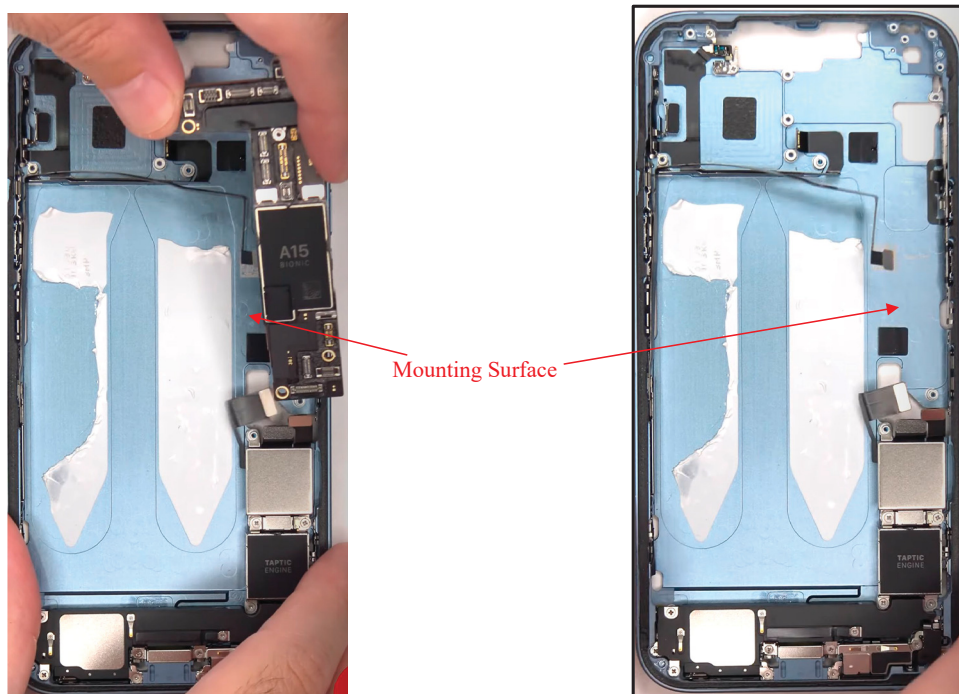
Each Accused Product's engagement means further comprises, as discussed further at **1.17** below, a transmission portion connecting said sensor to said attachment means of said housing, which is the portion of the logic board that connects the sensor to the attachment means (screws and screw holes). For example, as shown below in the simplified schematic illustration of the exemplar iPhone 14 Plus, the sensor (accelerometer, *see 1.3*) is connected to the attachment means (screws and screw holes, *see 1.16*) via a portion of the logic board. When the user taps on the back of the iPhone, a vibration is created and transmitted through the logic board to the sensor.



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[1.2.c] for a “mounting surface”

Each accused product includes a “mounting surface.” The mounting surface is the part of the iPhone that engages with the housing:

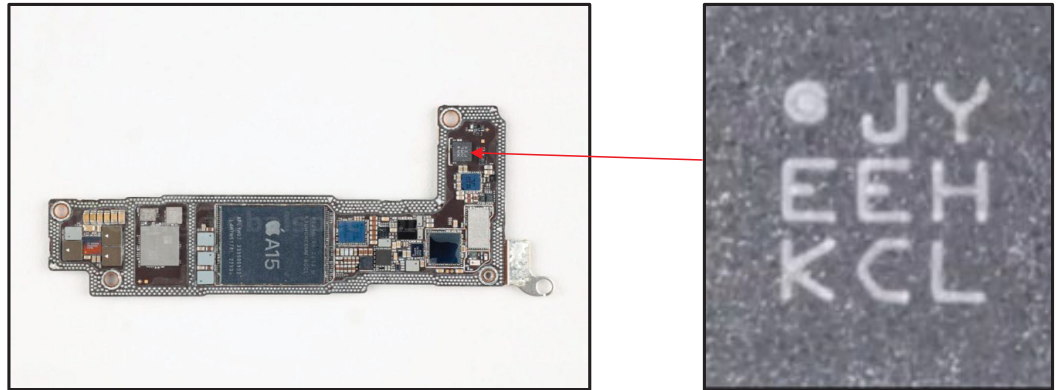


Source: PBKreviews, *Apple iPhone 14 Plus Disassembly Teardown Repair Video*, https://www.youtube.com/watch?v=QlkC6_AiinU; <https://www.youtube.com/watch?v=TNWOROMpmsk> (annotated).

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[1.3] “a sensor contained within said housing”

Each Accused Product has “a sensor contained within said housing.” The “sensor” comprises at least the accelerometer contained within the logic board assembly and/or any other sensors. In the exemplar iPhone 14 Plus, the sensor includes at least the component referred to as a “Bosch Sensortec” or “6-axis” IMU. The image below shows the sensor contained within the logic board assembly:



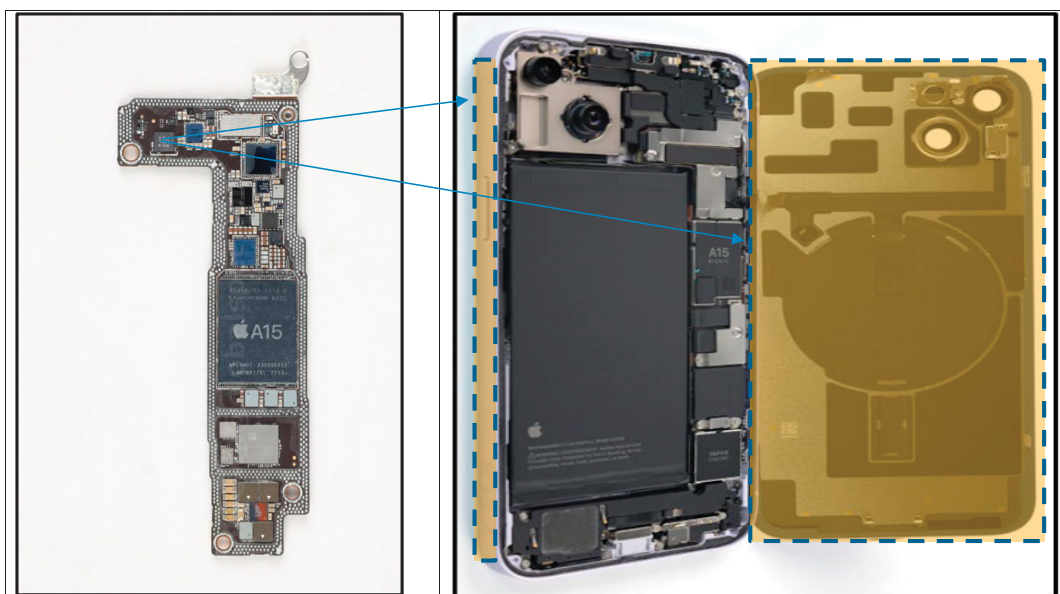
Source: *Electronics 360 News Desk, TechInsights Teardown: Apple iPhone 14 Plus*,
<https://electronics360.globalspec.com/article/19881/techinsights-teardown-apple-iphone-14-plus>

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[1.4] said sensor forming an interactive zone defined by a range of said sensor,

Each Accused Product contains a “sensor forming an interactive zone defined by a range of said sensor.” The “interactive zone” includes the back side and/or the sides of the iPhone.

Because the sensor (accelerometer) detects taps on the back side or sides of the iPhone to operate the Back Tap feature, the range of the sensor (accelerometer) defines the interactive zone:

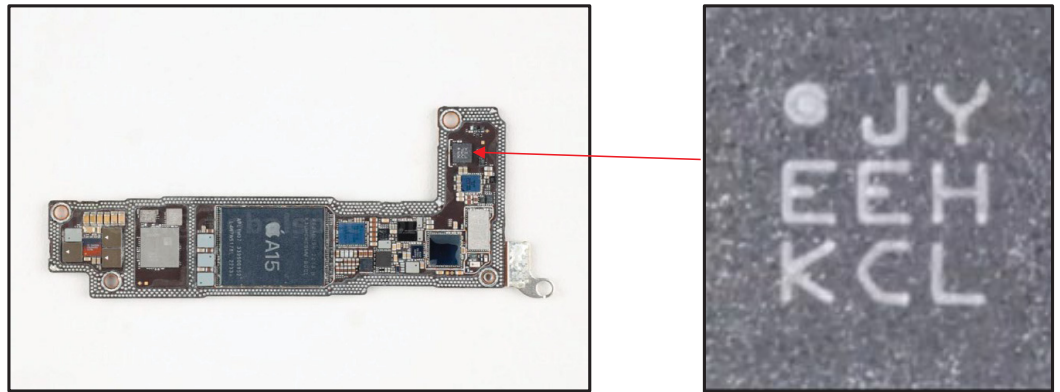


Source: iPhone 14 Plus Teardown, <https://www.ifixit.com/News/66394/the-iphone-14-plus-is-more-repairable-too> (annotated).

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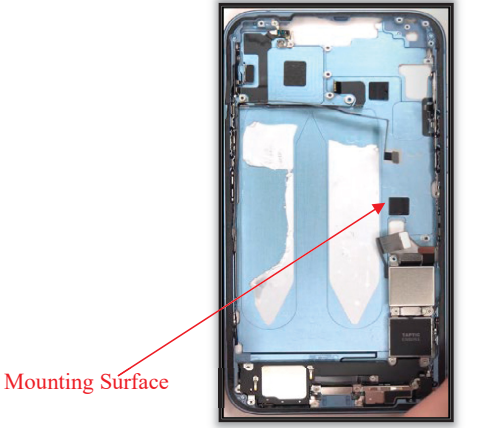
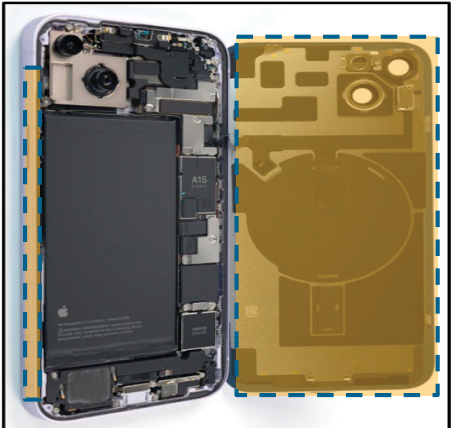
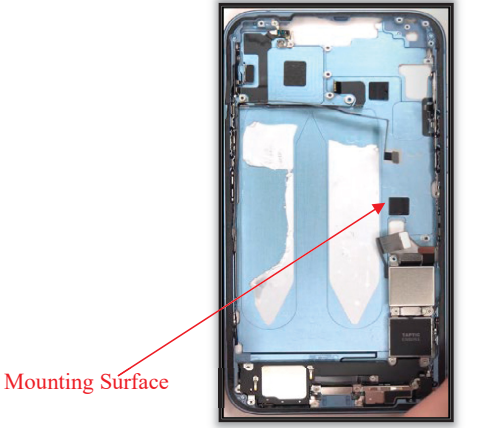
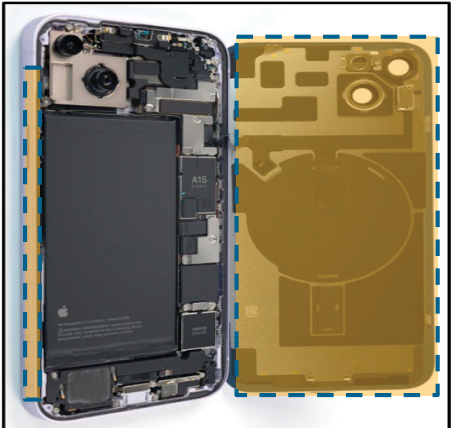
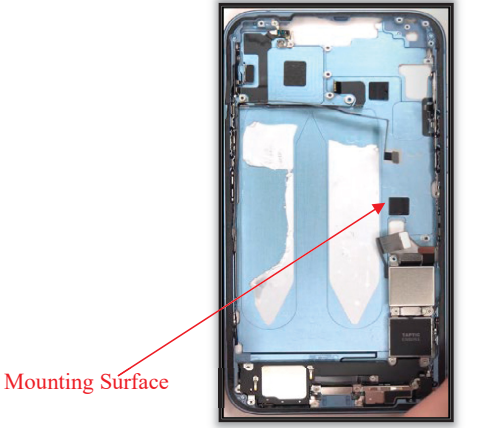
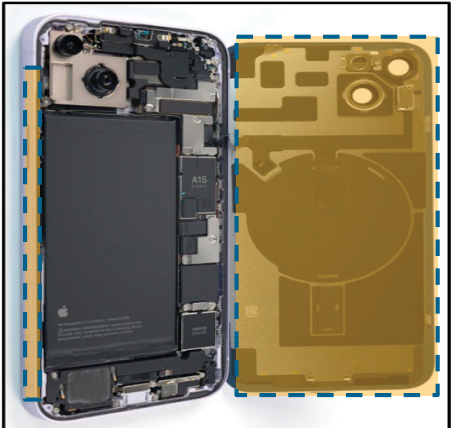
[1.5] said sensor being comprised of an accelerometer,

In each Accused Product, the sensor is comprised of an accelerometer. The sensor comprises at least the accelerometer contained within the logic board assembly. In the exemplar iPhone 14 Plus, the sensor includes at least the component referred to as a “Bosch Sensortec” or “6-axis” IMU. Upon information and belief, the sensor in the exemplar iPhone 14 Plus is a Bosch Sensortec IMU that includes accelerometer functionality. The image below shows the sensor contained within the logic board assembly:

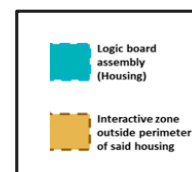
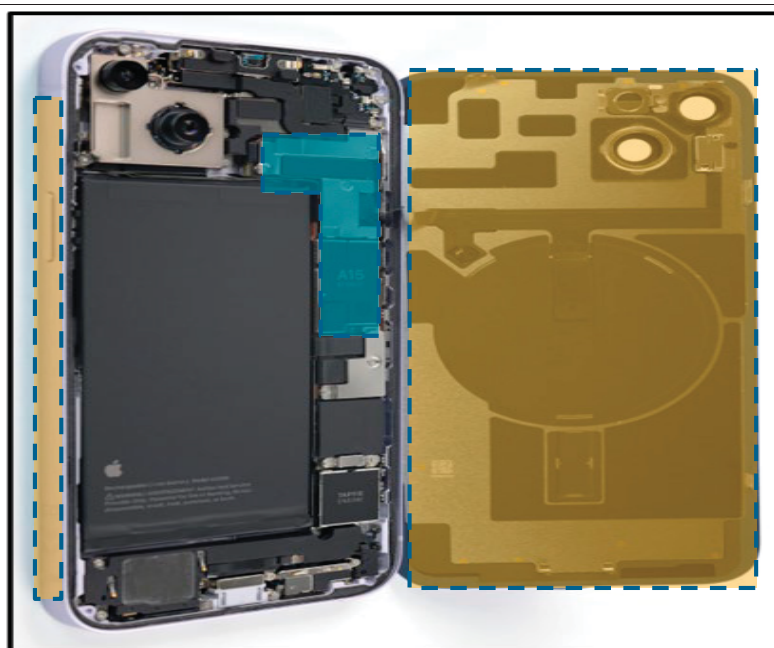


Source: Electronics 360 News Desk, TechInsights Teardown: Apple iPhone 14 Plus,
<https://electronics360.globalspec.com/article/19881/techinsights-teardown-apple-iphone-14-plus>

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[1.6] said interactive zone being aligned with said mounting surface	In each Accused Product, “said interactive zone being aligned with said mounting surface.” The “mounting surface” is the part of the iPhone that engages with the housing, as described above at 1.2.c. The “mounting surface” is aligned with the “interactive zone,” for example, on the back side or sides of the iPhone, where the interactive zone overlays the mounting surface: <table border="1" data-bbox="508 728 1576 1207"> <thead> <tr> <th data-bbox="508 728 1040 762">Mounting Surface</th><th data-bbox="1040 728 1576 762">Interactive Zone</th></tr> </thead> <tbody> <tr> <td data-bbox="508 762 1040 1207">  Mounting Surface </td><td data-bbox="1040 762 1576 1207">  </td></tr> </tbody> </table>	Mounting Surface	Interactive Zone	 Mounting Surface	
Mounting Surface	Interactive Zone				
 Mounting Surface					
[1.7] and overlaying said mounting surface outside a perimeter of said housing,	Each Accused Product contains an interactive zone that is “overlaying said mounting surface outside a perimeter of said housing.” The interactive zone spans the back side and/or sides of the iPhone and overlays the mounting surface. Because the back side and sides of the iPhone are larger than the housing, the interactive zone is “outside a perimeter of said housing.” The Back Tap feature responds to taps on the back side or sides of the iPhone, including near the corners. The annotated images below show how the interactive zone “overlays” the mounting surface “outside a perimeter of said housing”:				

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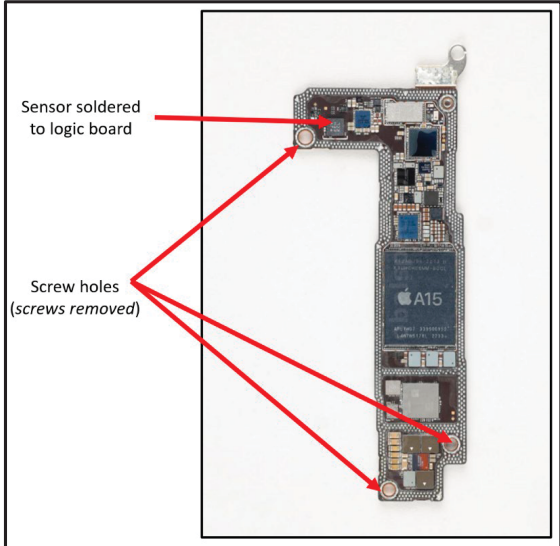


Source: iPhone 14 Plus Teardown, <https://www.ifixit.com/News/66394/the-iphone-14-plus-is-more-repairable-too> (annotated).

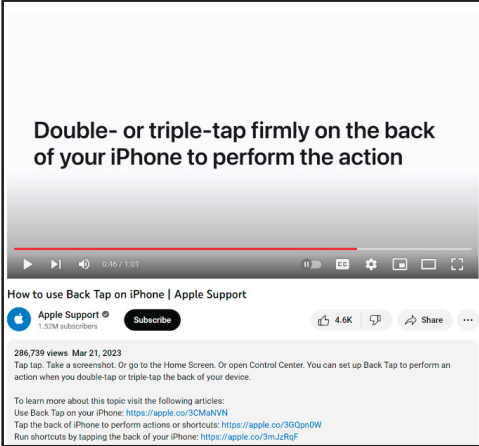
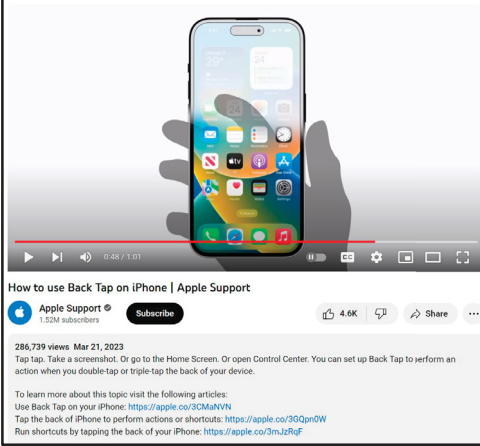
[1.8] said sensor being in a fixed position relative to said engagement means, wherein a contact interaction associated with said mounting surface within said interactive zone is detected by said sensor as data signals,

Each Accused Product contains a “sensor being in a fixed position relative to said engagement means, wherein a contact interaction associated with said mounting surface within said interactive zone is detected by said sensor as data signals.” This element is discussed in further detail below at **1.8.a** and **1.8.b**.

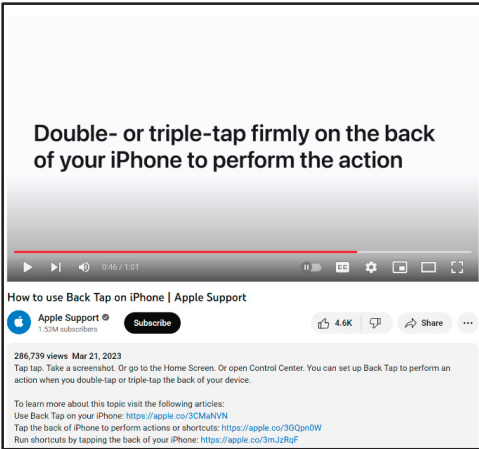
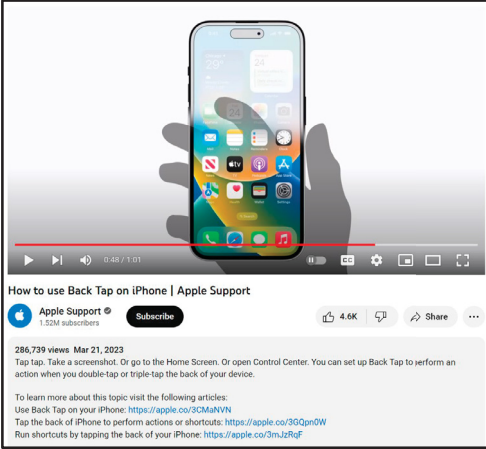
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[1.8.a] said sensor being in a fixed position relative to said engagement means,	In the exemplar image of the iPhone 14 Plus shown below, the engagement means includes at least the attachment means (screws and screw holes, <i>see</i> 1.16) and a transmission portion connecting the sensor to the attachment means (<i>see</i> 1.17). In each of the Accused Products, the sensor (accelerometer, <i>see</i> 1.3) is soldered to the housing (logic board assembly). Because the sensor is fixed in place on the housing, the sensor (accelerometer) is “in a fixed position relative to” the engagement means:  The image shows the internal logic board of an iPhone 14 Plus. A red arrow points to a small component labeled 'Sensor soldered to logic board'. Another red arrow points to a set of circular marks labeled 'Screw holes (screws removed)'. A third red arrow points to a component at the bottom of the board.
[1.8.b] wherein a contact interaction associated with said mounting surface within said interactive zone is detected by said sensor as data signals,	In each of the Accused Products, a “contact interaction” includes a double-tap or triple-tap on the back of the iPhone. Because the mounting surface is within the “interactive zone” of the back side or sides of the iPhone, the contact interaction on the back of the iPhone impacts the mounting surface and is “associated with said mounting surface within said interactive zone.” The sensor (accelerometer) detects the contact interactions (taps) as data signals.

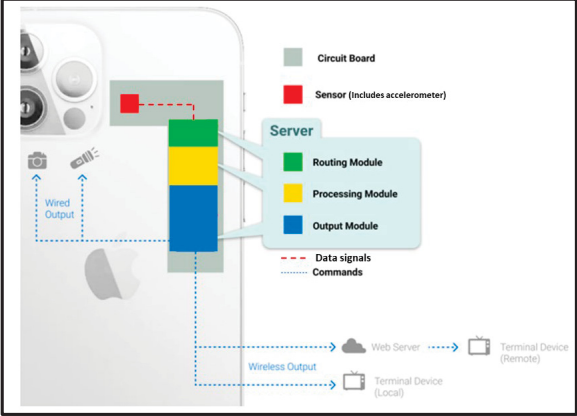
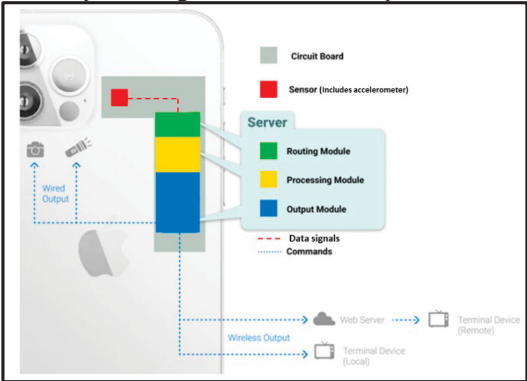
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	For instance, in its support videos, Apple explains that users can “double- or triple-tap firmly on the back of your iPhone,” which is detected by the sensor as data signals to use the Back Tap feature:   <i>Source: Apple Support, How to use Back Tap on iPhone, https://youtu.be/Z4ZeFJ65iXc.</i>
[1.9] said contact interaction being comprised of an impact on said mounting surface, said data signals being comprised of vibration data of said contact interaction;	Each Accused Product includes a “contact interaction being comprised of an impact on said mounting surface, said data signals being comprised of vibration data of said contact interaction.” In each of the Accused Products, double-taps and triple-taps on the back of the iPhone are contact interactions that impact the mounting surface. These contact interactions (taps) generate data signals that are comprised of vibrations. The contact interactions have certain characteristics that allow the vibrations to be identified as at least double-taps or triple-taps and that comprise “vibration data” that the sensor detects as “data signals.”

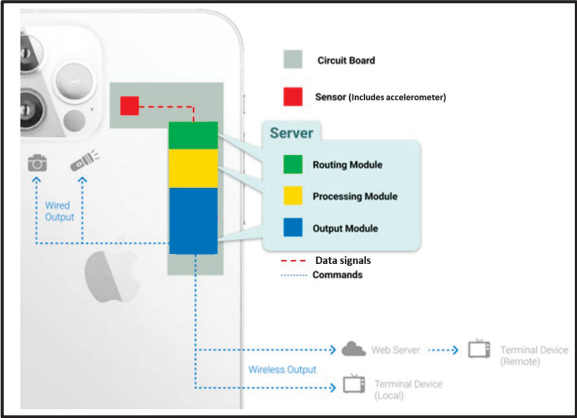
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	For instance, in its support videos, Apple explains that users can “double- or triple-tap firmly on the back of your iPhone,” and these tap vibrations are detected by the sensor as data signals to use the Back Tap feature:   <i>Source: Apple Support, How to use Back Tap on iPhone, https://youtu.be/Z4ZeFJ65iXc.</i>
[1.10] a server in communication with said sensor,	Each Accused Product contains “a server in communication with said sensor.” As discussed in greater detail below, the sensor is in communication with other components on the logic board assembly, one or more of which comprises a server. The connection between the server and the sensor can be wireless or wired, and may also include a router, Wi-Fi, Bluetooth, or a local area network. The following simplified block diagram shows an exemplary configuration of a server in the Accused Products that is in communication with a sensor:

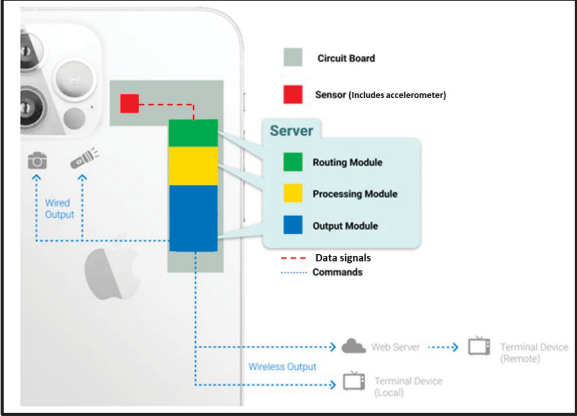
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	 The diagram illustrates a system architecture. On the left, a portion of a device (resembling an iPhone) is shown with a 'Circuit Board' and a 'Sensor (includes accelerometer)'. A 'Server' is connected to this device. The 'Server' is composed of three stacked modules: a 'Routing Module' (green), a 'Processing Module' (yellow), and an 'Output Module' (blue). The 'Sensor' sends 'Data signals' (indicated by red dashed lines) to the 'Routing Module'. The 'Routing Module' sends 'Commands' (indicated by blue dotted lines) to the 'Processing Module', which then sends them to the 'Output Module'. The 'Output Module' has two output paths: 'Wired Output' (blue dashed line) and 'Wireless Output' (blue dotted line). The 'Wireless Output' path connects to a 'Web Server' (cloud icon), which then connects to two 'Terminal Device' icons: one labeled '(Remote)' and one labeled '(Local)'.
[1.11] said server being comprised of a routing module, a processing module being connected to said routing module, and an output module connected to said processing module,	Each Accused Product contains a “server being comprised of a routing module, a processing module being connected to said routing module, and an output module connected to said processing module.” The following simplified block diagram shows an exemplary configuration of a server in the Accused Products, where the server includes a routing module, a processing module, and an output module:  This diagram is identical to the one in the first row, showing the same system architecture with the circuit board, sensor, server modules (routing, processing, output), and connections to local and remote terminal devices via wired and wireless outputs.

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[1.11.a] said server being comprised of a routing module,	In each of the Accused Products, the “routing module” receives data signals from the sensor. The routing module comprises at least the circuitry that forms the path from the sensor to the processing module, as well as any intermediate registers, level translators, connectors, interfaces, or logic for connecting the sensor to the processing module. In the exemplar iPhone 14 Plus, the routing modules include the outbound connections from the sensor to the processing module. The following simplified block diagram shows an exemplary configuration of a server in the Accused Products, where the server includes a routing module:  The diagram illustrates a server configuration. On the left, a portion of an iPhone 14 Plus is shown with a sensor (red square) and a routing module (green square) on its circuit board (grey). The routing module is connected to a processing module (yellow square) and an output module (blue square). The output module is connected to a web server (cloud icon) and two terminal devices (remote and local). Data signals (dashed red lines) flow from the sensor to the routing module, and from the routing module to the processing module. Commands (dotted blue lines) flow from the web server and terminal devices to the output module. The legend indicates: Circuit Board (grey), Sensor (Includes accelerometer) (red), Routing Module (green), Processing Module (yellow), Output Module (blue), Data signals (dashed red line), and Commands (dotted blue line).
[1.11.b] a processing module being connected to said routing module,	In each of the Accused Products, the “processing module” determines the data pattern corresponding to the data signals and includes at least the application processor (“SOC”) of the iPhone and/or the integrated motion coprocessor within the application processor. In the exemplar iPhone 14 Plus, the processing module is referred to as “A15.” The following simplified block diagram shows an exemplary configuration of a server in the Accused Products, where the server includes a processing module:

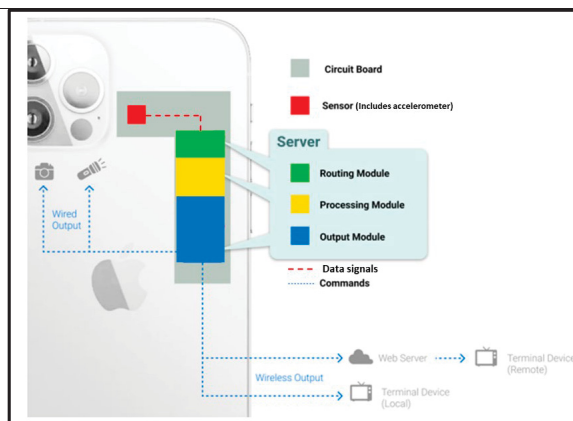
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[1.11.c] and an output module connected to said processing module.	The “output module” is connected to the processing module and transmits commands to a receiving module in a terminal device. In the Accused Products, the “output module” comprises the circuitry that forms the path from the processing module to the receiving module in a terminal device, as well as any intermediate registers, interfaces, level translators, connectors, interfaces, or logic for connecting the processing module to the receiving module in a terminal device. The following simplified block diagram shows an exemplary configuration of a server in the Accused Products, where the server includes an output module:

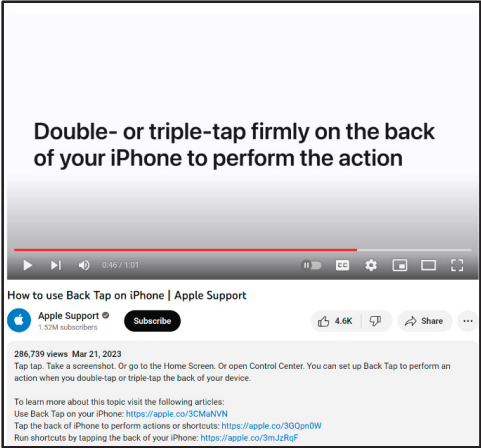
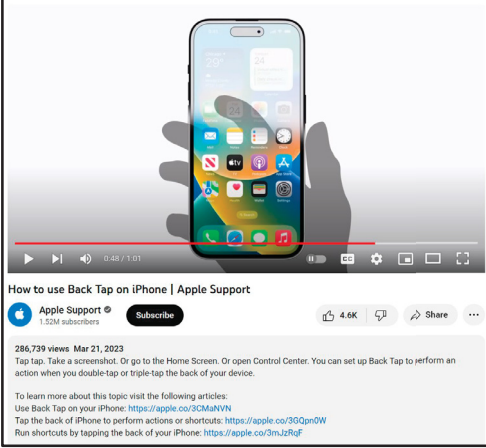
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[1.12] said routing module receiving said data signals from said sensor, said processing module determining a data pattern corresponding to said data signals of said contact interaction and matching said data pattern with a gesture profile,	Each Accused Product contains a “routing module receiving said data signals from said sensor, said processing module determining a data pattern corresponding to said data signals of said contact interaction and matching said data pattern with a gesture profile.” In each of the Accused Products, the accelerometer outputs are the “data signals.” The routing module receives those data signals from the sensor, and the processing module receives those data signals from the routing module. The processing module then determines whether the data signals represent a “data pattern” that corresponds to a matching gesture profile (including at least either a “Double Tap” or a “Triple Tap” gesture profile). The following simplified block diagram shows an exemplary configuration of a server in the Accused Products, where the server includes a routing module receiving data signals from a sensor, and a processing module determining a data pattern corresponding to data signals of a contact interaction and matching with a gesture profile:

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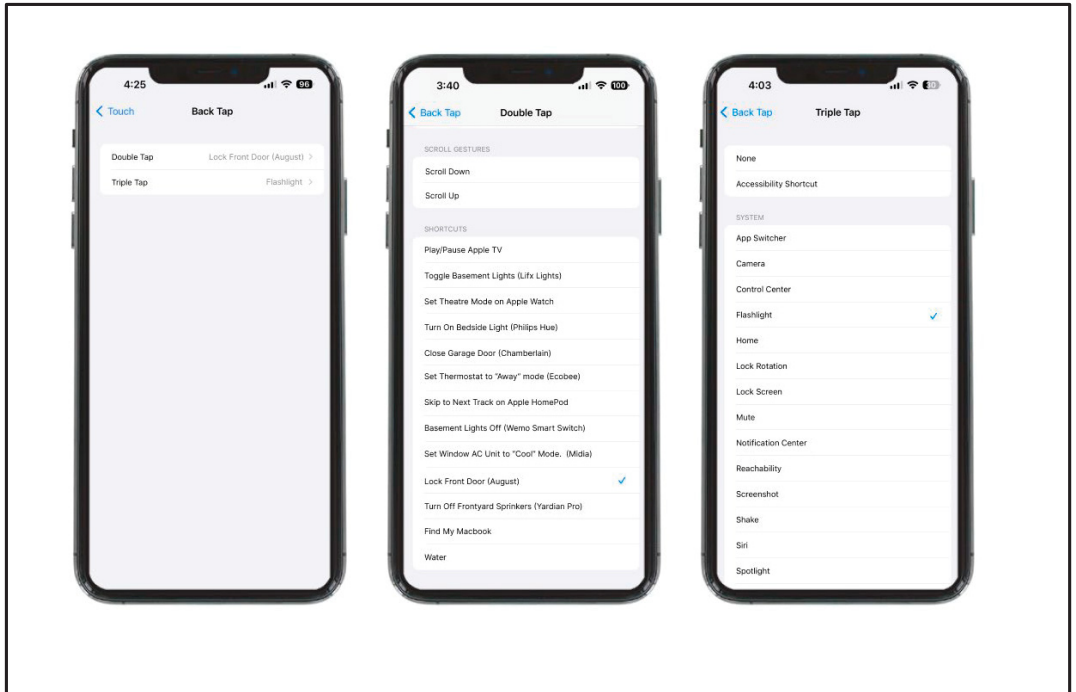


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	Apple explains that users can “double- or triple-tap firmly on the back of your iPhone” to use the Back Tap feature, as the processing module determines a data pattern corresponding to said data signals of said contact interaction and matches said data pattern with a gesture profile, such as a double tap gesture or a triple tap gesture:   <i>Source:</i> Apple Support, <i>How to use Back Tap on iPhone</i>, https://youtu.be/Z4ZeFJ65iXc.
[1.13] said gesture profile being associated with a command;	In each of the Accused Products, a “gesture profile” is “associated with a command.” The command associated with the gesture profile relates to the particular terminal device. As discussed below at 1.14, gestures can be associated with commands in terminal devices internal to the iPhone and/or terminal devices external to the iPhone. In the Accused Products, iPhone users can assign a command from a pre-configured list to either the Double Tap or the Triple Tap gesture profile. There are over 40 available commands, including “system,” “accessibility,” “scroll gestures,” and “shortcuts” commands that users can associate with the Double Tap or the Triple Tap gesture profile. Back Tap also automatically includes any user-created “shortcuts” commands within its list of available commands. For example, the double-tap or triple-tap gesture can be associated with at least the following exemplary commands: lower the temperature of a thermostat, turn on/off an external

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light or lamp, open or switch applications on the iPhone, open an online calendar software program, activate the iPhone camera, turn on/off the iPhone flashlight, activate Siri, play/pause Apple TV, Apple Watch Mirroring, Assistive Touch, take a screenshot, “Control Nearby Devices,” lock the iPhone screen, turn the iPhone volume up or down, mute, scroll up and down, open specified applications, or engage the “Shortcuts” feature:



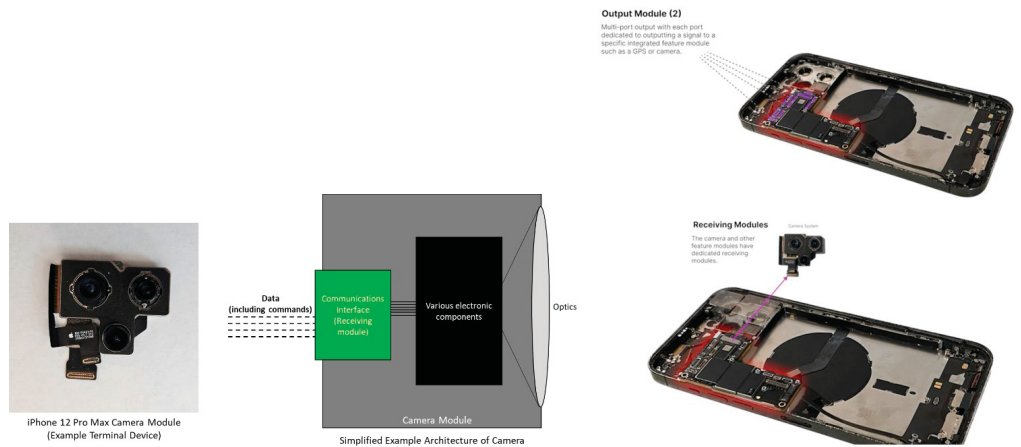
[1.14] a terminal device being comprised of a receiving module

Each Accused Product contains and/or interacts with a “terminal device being comprised of a receiving module.” More than one terminal device can be connected to the server, and the control system can also be used with multiple terminal devices. In each of the Accused Products, gestures can be associated with

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independent terminal devices internal to the iPhone and/or independent terminal devices external to the iPhone.

Examples of terminal devices comprised of a receiving module internal to the iPhone include at least the iPhone's camera, flashlight, speaker, lock controls, audio player, volume up, volume down, smartphone GUI (Lock Screen command), mute control, the screen, and other internal iPhone functions. These internal terminal devices contain receiving modules and have associated integrated electronics to receive commands from the output module. The image below illustrates one example of an internal terminal device and its corresponding receiving module:

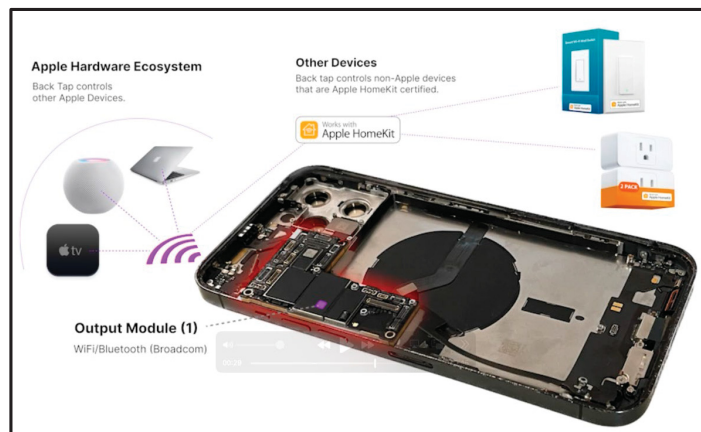


In the Accused Products, Double Tap and Triple Tap gestures can also be associated with terminal devices external to the iPhone through the “Shortcuts” and “Control Nearby Devices” features. Examples of terminal devices external to the iPhone include, but are not limited to, appliances (e.g., televisions, stereos, or coffee machines), lights with switches, devices running software, computers, laptops, tablets, smartphones, televisions, external lights or lighting fixtures, climate regulators, thermostats, or fans.

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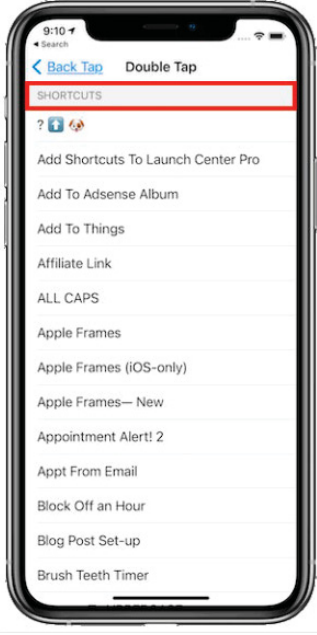
For example, the “Control Nearby Devices” command can be associated with terminal devices on the same local area network as the Accused Products, including Apple Watches, iPads, other iPhones, Apple TVs, Apple HomePods, Apple MacBook Laptops, third-party devices, and other HomeKit-compatible devices. All these terminal devices controllable via Back Tap receive commands at receiving modules from the Accused Products’ output modules. For terminal devices external to the Accused Products that are outside the Accused Products’ local area network, the Accused Products use Back Tap to activate and control those terminal devices through the Apple “Shortcuts” feature and the Apple “Home” application, which are integrated into Back Tap. For example, a user can create a shortcut that turns on or off all the lights in a home, and use the Back Tap feature to assign that command to either the double-tap or triple-tap gesture.

The following image identifies examples of external terminal devices controllable by Back Tap:



All shortcuts, including those associated with the Apple HomeKit-compatible smart-home devices owned by the user, are automatically listed in the Back Tap interface, can be configured and controlled by Back Tap, and are listed within the Shortcuts application of the iPhone:

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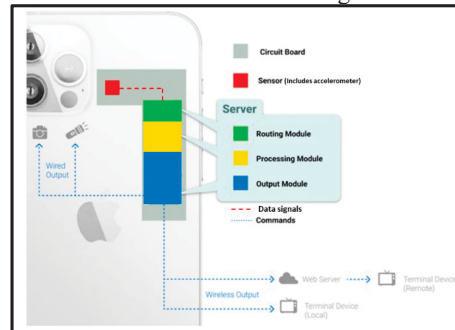
	 <i>Source: https://christianboyce.com/ios_backtap/</i>
[1.15 and means for initiating activity of said terminal device corresponding to said command, said terminal device being in communication with said server, said output module transmitting said command to said receiving module,	Each Accused Product includes a terminal device comprising a receiving module and “means for initiating activity of said terminal device corresponding to said command, said terminal device being in communication with said server, said output module transmitting said command to said receiving module.” In each of the Accused Products, the “means for initiating activity” of those terminal devices are the switches, transistors, physical actuators, other actuating mechanisms, and equivalents thereof for changing the status of a terminal device. The terminal device executing a command may be internal or external to the iPhone (<i>see</i> 1.13 and 1.14). For terminal devices internal to the iPhone, the “means for initiating activity” is the switch, transistor, physical actuator, or other actuating mechanism that activates the terminal device, e.g., the

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connection that activates the iPhone’s flashlight. For other terminal devices (e.g. alarm clock, Siri, cellular telephone, etc.) internal to the iPhone, they are actuated by a switch or other actuating mechanism that may be a switch hardware component, a switch component comprising a general or applications processor and programming, another type of actuating mechanism comprising a processor (e.g. general, applications, cellular baseband, graphics, global positioning system, etc.) and programming, or another actuating mechanism to change the status (e.g. on/off, raise/lowering, push/pull requests, etc.) of a terminal device.

For terminal devices external to the Accused Products, such as other iPhones, iPads, Apple TVs, Apple Watches, Apple HomePods, Apple MacBook Laptops, third-party devices, and other HomeKit-compatible modules, the “means for initiating activity” are the switches, transistors, physical actuators, other actuating mechanisms, and equivalents thereof that initiate the activity corresponding to the command communicated by the output module of the Accused Products.

In each of the Accused Products, the terminal device is in communication with the server, and the output module transmits the command to the terminal device’s receiving module:

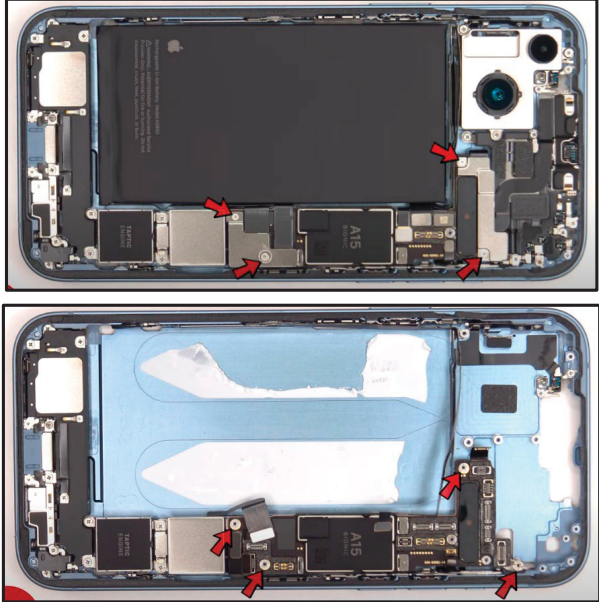


For example, HomeKit compatible devices can be controlled via a shortcut. The shortcut can be controlled via Back Tap (see 1.14). See <https://support.apple.com/guide/shortcuts/create-a-new-home-automation-apd2a290f633/ios> (explaining how to convert an automation into a shortcut).

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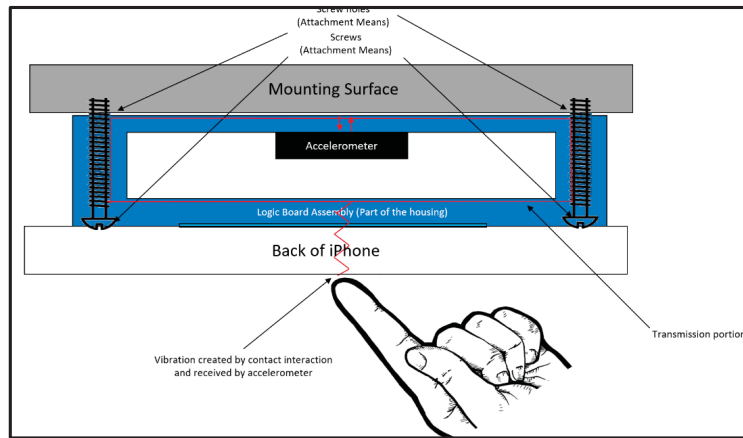
	
[1.16] wherein said engagement means of said housing comprises: an attachment means between said housing to said mounting surface;	Each Accused Product contains an engagement means that comprises “an attachment means between said housing to said mounting surface.” In each of the Accused Products, the “attachment means” include at least the threaded screws and screw holes in the logic board assembly that attach the logic board assembly to the mounting surface. The attachment means can also be an adhesive, mechanical fasteners, threaded screws and the associated screw holes, or other components that hold the housing to the mounting surface, and any equivalents thereof. In each of the Accused Products, the “attachment means” include at least the threaded screws and screw holes in the logic board assembly that attach the logic board assembly to the mounting surface:

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	 Source: PBKreviews, <i>Apple iPhone 14 Plus Disassembly Teardown Repair Video</i>, https://www.youtube.com/watch?v=QlkC6_AiinU; https://www.youtube.com/watch?v=TNWOROMpmsk.
[1.17] and a transmission portion connecting said sensor to said attachment means of said housing	Each Accused Product contains an engagement means that comprises an attachment means between said housing to said mounting surface and “a transmission portion connecting said sensor to said attachment means of said housing.” In each of the Accused Products, the “transmission portion connecting said sensor to said attachment means of said housing” is the portion of the logic board that connects the sensor to the attachment means (screws and screw holes). For example, as shown below in the simplified schematic illustration of the exemplar iPhone 14 Plus, the sensor (accelerometer, <i>see 1.3</i>) is connected to the attachment means (screws and screw holes,

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see 1.16) via a portion of the logic board. When the user taps on the back of the iPhone, a vibration is created and transmitted through the logic board to the sensor.



[1.18] and being comprised of a material with flexibility different than said mounting surface so as to set a rigid position of said sensor relative to said mounting surface,

Each Accused Product contains an engagement means that comprises an attachment means and a transmission portion that is “comprised of a material with flexibility different than said mounting surface so as to set a rigid position of said sensor relative to said mounting surface.”

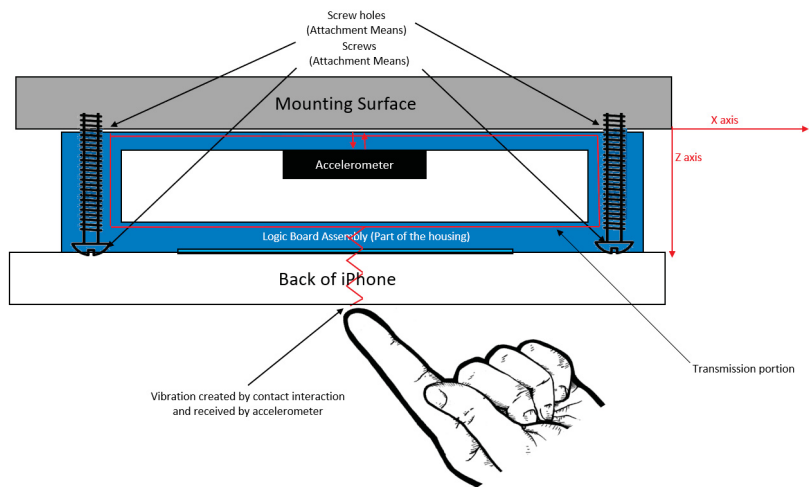
For example, in the exemplar iPhone 14 Plus, the transmission portion (part of the logic board) appears to be made of FR-4 or similar material. FR-4 is a glass epoxy composite material. The mounting surface of the iPhone 12 Pro Max, in contrast, is made, at least in part, of metal. On information and belief, the metal on the back of the iPhone is one or more of titanium, stainless steel, or aluminum (depending on the model of iPhone). Each of these metals has a different flexibility than FR-4.

In material science, Youngs modulus is a property that describes the stiffness of a particular material. Stiffness is the inverse of flexibility, so if two materials have different Youngs modulus values, they will have different

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flexibilities. FR-4 typically has a Youngs modulus in the range of 0.6 to 2.6 GPa. Titanium, stainless steel, and aluminum have Youngs modulus values of approximately 116, 193, and 68 GPa respectively.

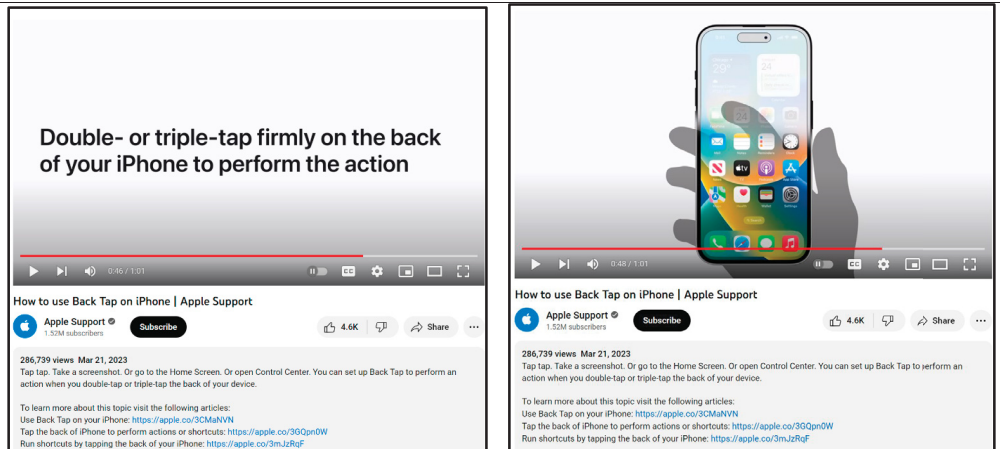
The image below shows a simplified two-dimensional representation of a cross-sectional portion of the exemplar iPhone 14 Plus. The X, Y (not shown), and Z axes are associated with the mounting surface. The accelerometer is soldered to the transmission portion (part of the logic board), which is rigid and attached to the mounting surface by the screws and screw holes. The accelerometer does not move along the X, Y, or Z axes relative to the mounting surface. Therefore, the sensor's position is rigid relative to the mounting surface.



[1.19] said contact interaction generating said data signals of said sensor through said transmission portion.

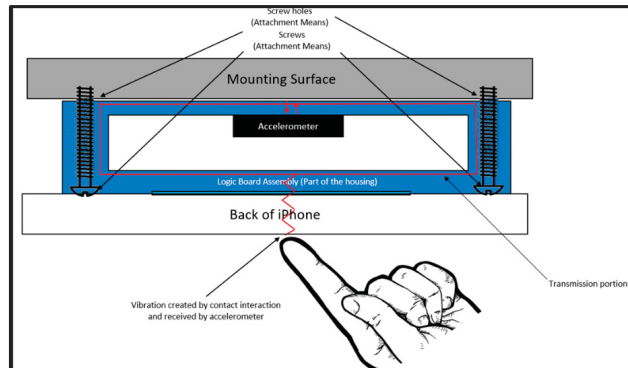
Each Accused Product comprises “said contact interaction generating said data signals of said sensor through said transmission portion.” In each of the Accused Products, the contact interaction (taps on back of the iPhone) generate data signals that are transmitted to the sensor (accelerometer) through the transmission portion (part of the logic board). For instance, Apple explains that users can “double- or triple-tap firmly on the back of your iPhone,” and the contact interaction from the double- or triple-tap generates, through the transmission portion, is detected by the sensor as data signals to use the Back Tap feature:

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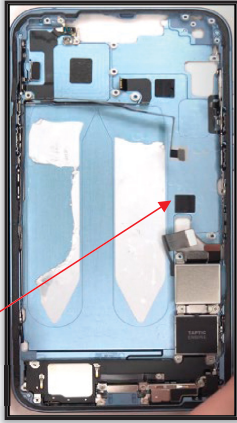
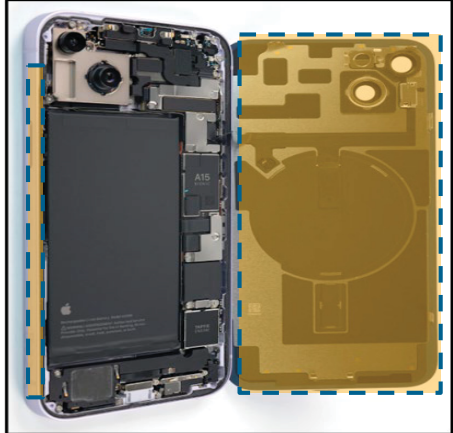
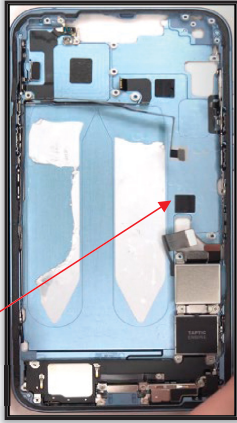
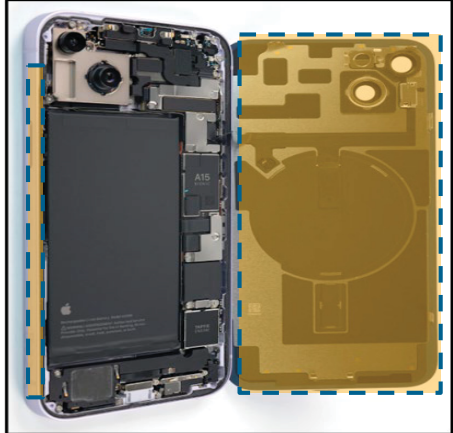
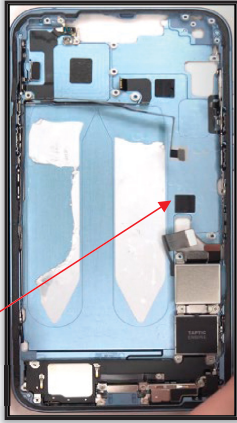
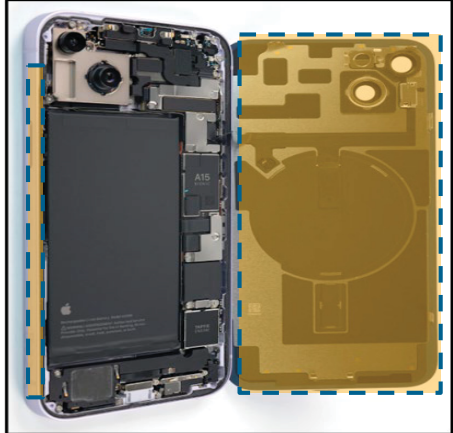


Source: Apple Support, *How to use Back Tap on iPhone*, <https://youtu.be/Z4ZeFJ65iXc>.

As further illustration, when the user taps on the back of the iPhone, a vibration is created and transmitted through the logic board to the sensor:



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Claim 2					
[2] The control system, according to claim 1, wherein said interactive zone of said sensor aligns with said mounting surface, said interactive zone being coplanar with said mounting surface.	Each Accused Product comprises a control system according to Claim 1 “wherein said interactive zone of said sensor aligns with said mounting surface, said interactive zone being coplanar with said mounting surface.” In the Accused Products, the “mounting surface” is aligned with the “interactive zone,” for instance, on the back side or sides of the iPhone where the interactive zone overlays the mounting surface. Further, because the interactive zone includes the back side and the sides of the iPhone, the interactive zone is also aligned with and is coplanar with the mounting surface. <table border="1" data-bbox="508 842 1576 1329"> <thead> <tr> <th data-bbox="508 842 1040 877">Mounting Surface</th><th data-bbox="1040 842 1576 877">Interactive Zone</th></tr> </thead> <tbody> <tr> <td data-bbox="508 877 1040 1329">  Mounting Surface </td><td data-bbox="1040 877 1576 1329">  </td></tr> </tbody> </table> Additionally, the interactive zone includes the back side and sides of the iPhone (see 1.4), which is substantially on the same plane as the mounting surface, which is also connected to the back side and sides of the iPhone (see 1.2.c), and thus the interactive zone is coplanar with the mounting surface.	Mounting Surface	Interactive Zone	 Mounting Surface	
Mounting Surface	Interactive Zone				
 Mounting Surface					

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Claim 4	
[4] The control system, according to claim 1, wherein said contact interaction is comprised of an impact on said mounting surface, said data signals having a respective defined peak corresponding to each impact, a defined time period after a last defined peak, said data pattern being comprised of each defined peak and said defined time period after said last defined peak.	Each Accused Product comprises, “wherein said contact interaction is comprised of an impact on said mounting surface, said data signals having a respective defined peak corresponding to each impact, a defined time period after a last defined peak, said data pattern being comprised of each defined peak and said defined time period after said last defined peak.” The peak amplitude point of each vibration is used as it would be arbitrary to use any other time sample from the impacts. Furthermore, it is evident that the time between the impacts is used for the data pattern because a triple tap is not recognized by the iPhone’s Back Tap feature unless the time period between the first and second vibration has minimal variation from the time period between the second and third vibration. For double taps, there is only one time period between impacts so there is merely a maximum and minimum allowed time period between impacts of a double tap. This is evident by the fact that both extremely fast and extremely slow double taps are ignored.
Claim 5	
[5] The control system, according to claim 1, wherein said contact interaction is comprised of a plurality of impacts on said mounting surface, said data signals having a respective defined peak corresponding to each impact, a measured time period between each defined peak, and a defined time period after a last defined peak, said data pattern being comprised of each defined peak, each measured time period, and said defined time period after said last defined peak.	Each Accused Product comprises, “wherein said contact interaction is comprised of a plurality of impacts on said mounting surface, said data signals having a respective defined peak corresponding to each impact, a measured time period between each defined peak, and a defined time period after a last defined peak, said data pattern being comprised of each defined peak, each measured time period, and said defined time period after said last defined peak.” Apple’s Back Tap feature detects gestures comprised of a plurality of impacts on the mounting surface, and as explained above with respect to Claim 4, the respective peaks and time periods are used to help decipher the gestures.

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Claim 9	
[9] The control system, according to claim 1, further comprising: an additional terminal device being comprised of an additional receiving module and additional means for initiating activity of said additional terminal device corresponding to an additional command, said additional terminal device being in communication with said server, said output module transmitting said additional command to said additional receiving module.	Each Accused Product comprises, “an additional terminal device being comprised of an additional receiving module and additional means for initiating activity of said additional terminal device corresponding to an additional command, said additional terminal device being in communication with said server, said output module transmitting said additional command to said additional receiving module.” Apple TV and Apple Home Pod are examples of terminal devices with a receiving module and additional means for initiating activity of other terminal devices. Both Apple TV and Apple Home Pods function as Apple “Home Hubs,” which can receive commands from the output module of the iPhone and then relay commands to other terminal devices that are HomeKit compatible. The “additional means for initiating activity” are the switches, transistors, physical actuators, other actuating mechanisms, and equivalents thereof that initiate the activity corresponding to the additional command communicated by the output module of the Accused Products and equivalents thereof.