

Susan Alzaim

Haptic Magic

The magic behind iPhone vibrations.



iPhone

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Apple's introduction of haptics into our iPhones has changed the way we interact with technology, opening a new avenue towards machine and human communication. Used interchangeably with the terms **Haptic Technology** and **Haptic Feedback**, haptics is the specific technology that's simulates tactile sensations in interfaces, by recreating the sense of touch or movement in an otherwise immovable object. These touch experiences, or Haptic Feedback, encapsulate forces, vibrations or motions transmitted to the user when interacting with the device.

The **Haptic Touch** is possible through Apple's unique in-house built vibration motor, or Linear Resonant Actuator (LRA), branded the **Taptic Engine**. It's particular engineering, shape and size, and devoted space within the device's tight shell, ensures the motor is optimised to resonate frequencies of quick, precise taps. What sets Apple's Taptic Engine apart from the market is its integration of hardware and software, providing users with the ability

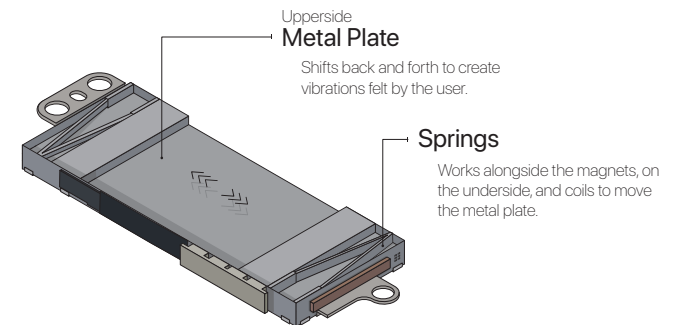
to customise tactile feedback patterns for more personalisation of devices.

Working in correspondence with Haptic Touch, the Taptic Engine provides the user with haptic feedback when the electromagnetic coil piles become energised, stimulating the magnets attached to the metal plate, and allowing the springs to move the mechanism back and forth. This causes vibration patterns and a tactile experience for the user.

Haptic Touch is a recent addition to the latest Apple products, replacing 3D touch and force touch with software that relies on the length of time a user touch event occurs on the screen, rather than the amount of pressure applied. The device acknowledges the user interactions through vibrations produced by the LRA Taptic Engine, formulating a method of communication between machine and human.

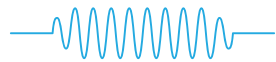
In terms of software, **Core Haptics** is an API, providing the two basic building blocks that generate Haptic Feedback and allow customisation of haptic patterns by tapping into the Taptic Engine. Haptics are possible

Taptic Engine (LRA)



Haptics Visualised

Continuous Vibration



Waveform of a continuous haptic experience.

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Apple's visual refinement of a continuous haptic experience.

Transient Vibration



Waveform of a transient haptic experience. A momentary event.

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Apple's visual refinement of a transient haptic experience.

Sharpness



A sharp and precise haptic experience felt by the user.



A soft and rounded haptic experience felt by the user.

Intensity



A haptic experience that is intense in vibrational behaviour.



A haptic experience that is acute in vibrational behaviour.

in two different states, as *Transient* events: brief, compact vibrations that feel like taps or impulses, or *Continuous* events: sustained vibrations that are extended.

From these two event standards, *Intensity* and *Sharpness* of the tactile experience are customisable. Intensity varies the haptic, or vibrations, amplitude or strength, while the Sharpness determines the character of the haptic experience. Sharpness values can convey a crisp, precise and mechanical haptic experience, or, a soft, rounded and organic one.

In addition, iOS manages default system haptics in terms of strength and behaviour of Haptic Feedback. There are three default haptics that complement the user experience, creating diverse tactile experiences and vast communication possibilities between human and machine.

1. **Notifications:** conveyed via three defaults; Success, Warning and Failure.
2. **Selections:** communicate movement and conveys an actively changing selection.

3. **Impacts:** values that provide physical metaphors to the experience via five standards; Light, Medium, Heavy, Rigid and Soft.

Haptics in our iPhones push the possibilities of interaction and communication between users and their device. Implemented on iPhone X and later models, Haptic Touch has paved the way for increased user experience, formulating methods of personalisation and greater accessibility for the user.

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Taptic Engine Breakdown

