

Technical Description of Apple Smart Watch

Apple Smart Watch

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Author's Note

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Abstract

The Apple Watch, innovation at it's finest. The purpose of this technical description is to discuss the design, parts, and circuitry of the Apple Smart Watch. It will contain everything from the innovation's history to its interior function and how it impacted the technology industry as a whole. The Apple Watch will forever be known as a device that shook the watch industry.

Introduction

The Apple Smart Watch is a smart device resembling a wrist watch but acts like a miniature scale computer you can take just about anywhere. The smart watch takes the already convenient iPhone and combines it with a wristwatch to make an even smaller device with just as many tools and functionalities at your disposal. Some of its functionalities include bluetooth, gps, fitness tracking, messaging, calling, and even has its own camera as well as functioning how a normal watch would take time (Miles & Grabham, 2019). The user interface of the Apple Smart Watch allows quick access from anything to the time of day to weather right on the user's wrist (*fig. 1*). The apple watch uses the latest sensory technology to perform all these functions and make the user feel it's not just a watch but also a smart device.



Figure 1. Apple Smart Watch user interface. Reprinted from "Apple Watch Series 3 review: A terrific smartwatch for the price" by S.Miles, and D. Grabham, 2019.

Background

The creation of the Apple Watch was heavily influenced by Apple's Senior Vice President of Design, Jony Ive and Vice President of Technology, Kevin Lynch ("Apple Watch History & Timeline", n.d.). The Apple Watch's purpose was very unclear to these two creators during the beginning of the product's development ("Apple Watch History & Timeline", n.d.). Eventually the Apple Smart Watch would soon find its identity amongst the constantly evolving tech filling up the market every year. Over the course of the Apple Watch's history, it has evolved into 4 major series. As more series released over the years, each series has had everything from an increase in processing power to added features ("Apple Watch History & Timeline", n.d.). To put it simply, the watch's purpose is to connect users just like a smart phone does but not demand their constant attention ("Apple Watch History & Timeline", n.d.). Smartphones demand constant attention with alerts, buzzes, messages, and phone calls, but the Apple Watch would allow its users to be connected without feeling absolutely chained to the device. It's much more casual and this is what Jony Ive and Kevin Lynch intended ("Apple Watch History & Timeline", n.d.). Instead of prolonged interactions with the device, the Apple Watch's unique user interface allows for quick responses just like how we use wrist watches to tell time.

Apple Smart Watch list of parts and functions

The Apple Watch is an electronic device with many different components that allow its functionalities. The Apple Watch consists of the base, heart-rate sensor, induction charger, battery, taptic engine, loudspeaker, touchscreen and band (*fig. 2*). In addition, it also has a digital crown and friends button that allow users to scroll through menus and open up contacts (*fig. 2*). The brain of the device is called a System in Package or (SiP) chip. It contains many important components such as the RAM, flash storage, processor, CPU, and GPU which ultimately determines the power of the device (Woollaston, 2015). The S1 is covered in a protective shell which was designed to protect the chip from impact and water. A Near Field Communication chip is also included in the Apple Watch to allow people to make payments using their wrist through Apple Pay (Woollaston, 2015). The Taptic Engine is a linear actuator inside the Apple Watch that produces haptic feedback which is used to send heartbeats to friends (Woollaston, 2015). On the back of the Apple Watch's case, a cover with sapphire lenses sits above a sensor that uses infrared and visible-light LEDs and photodiodes to detect the user's heart rate (Woollaston, 2015). The battery is next up and can last upwards of 18 hours of use. The Apple Watch also uses MagSafe technology with inductive charging which is built on the underside of the watch base and can be charged wirelessly by placing a connector onto a charging port (Woollaston, 2015). The Apple Watch comes in a variety of different sizes, but the largest one measures 42x38x10.7 mm with a square frame and weighs 48 grams (Miller, 2018). The build consists of a glass front, ceramic back, with a steel frame (Miller, 2018). The components that make up the apple smart watch are the digital crown, friends button, customisable appearance

band, induction charger, touchscreen, taptic engine, battery, S1 chip, loudspeaker, custom heart-rate sensor



Figure 2. Interior components of Apple Watch. Reprinted from “Take a peek inside the Apple Watch” by V. Wollaston, 2015.

I. S1 Chip

The S1 chip (fig.3) is a vital component to the Apple Watch as it contains the electronic circuitry within the device that executes instructions that makes up the

program. The chip contains the main processing unit, flash storage, gyroscope and accelerometer (Morrison & Yang, 2015). The material for the S1 chip is primarily silicon with an impressively small 28x26 mm area (Morrison & Yang, 2015).

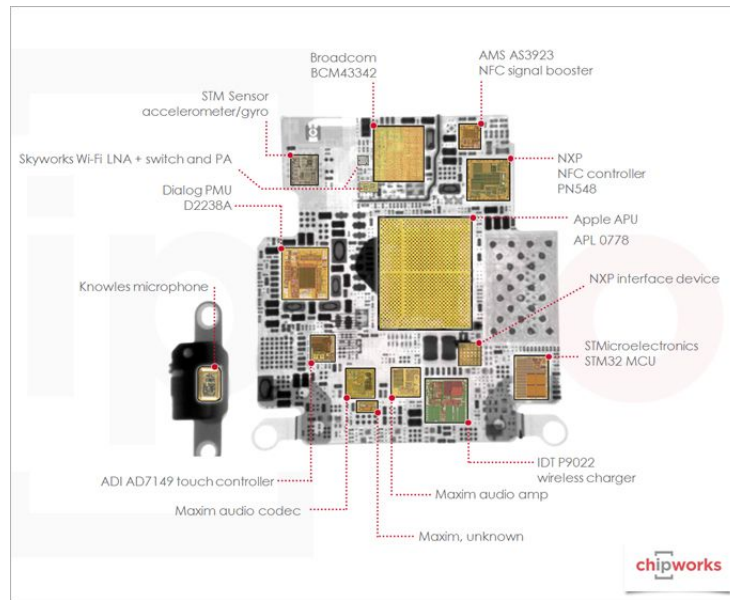


Figure 3: S1 chip interior circuitry. Reprinted from “Inside the Apple Watch: Technical Teardown” by J. Morrison, and D. Yang, 2015.

II. Battery

The battery of the Apple Watch like any battery supplies voltage to the device. It has a 205milliamperere battery with 38mm in length (Swider, 2015). The battery life is approximately 18 hours which means power supply can run for that duration of time until it will die and have to recharge (*fig. 2*) (Swider, 2015).

III. Taptic Engine

The taptic engine is an actuator inside the smartwatch that taps the user on the wrist to give feedback (What is the Taptic Engine, nda). This feedback could be

anything from notifications to alarms (What is the Taptic Engine, nda). Different alerts produce different sensations from the taptic engine (What is the Taptic Engine, nda). It is slightly smaller in length than the battery and S1 chip (*fig. 2*).

IV. Touchscreen

The Apple Smart Watch has a 1.78 inch display with a 448x368 pixels resolution (Miller, 2018). The touchscreen also has force touch technology which distinguishes between a tap and a press through electrodes. This brings a variety of different controls available for the user interface (*fig. 2*) (Woollaston, 2015).

V. Digital Crown

The digital crown is the Apple Watches home button. It allows for an array of more control over the device without obscuring what's on the screen (Woollaston, 2015). The digital crown rests on the right side of the smart watch and can be pressed and rotated (*fig. 2*) (Woollaston, 2015).

VI. Induction Charger

The induction charger allows the apple watch to be charged wirelessly. With a series of magnets this allows this to be possible and as a result more convenient. (*fig. 2*) (Woollaston, 2015).

VII. Louder Speaker

The louder speaker is simply the speaker of the device where sound is produced from the various apps in the watch (*fig. 2*) (Woollaston, 2015).

VIII. Custom Heart Rate Sensor

The custom heart rate sensor detects and measures the users' heart rate with the help of infrared and visible LEDs (*fig. 2*) (Woollaston, 2015).

IX. Customisable Appearance

This band comes in a variety of colors. The material is rubber and can be replaced to another the user might like (*fig. 2*) (Woollaston, 2015).

X. Friends Button

The friends button serves as a button to bring up the users contacts. This sits on the side of the screen and is very convenient for contacting friends (*fig. 2*) (Woollaston, 2015).

Conclusion

Apple wanted to change the way we see wrist watches and make them part of the age of smart devices. It can be used by just about anybody. You can send messages to people without ever having to take out your phone. This product especially appeals to those with busy lifestyles and schedules and want notifications right on their wrist.

The Apple Smart Watch is innovation at it's finest. Apple wanted to reinvent the watch into a device that connects us all even more. Through its unique easy to use interface, it doesn't function as a phone but rather something completely different: as a more casual, quicker to use smart device. With its taptic engine, sensory technology, and user interface the Apple Watch attempts to connect with you in order for you to connect with other people.

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