

Technical Description of the Apple AirPods 1

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Introduction

Apple AirPods are a pair of wireless earbuds that can connect to one device at a time through the utilization of Bluetooth (Johnson, 2021). Earbuds are essentially tiny speakers compacted into a gadget that fits into your ear. Due to the convenience of wireless earphones, AirPods are very popular in the current day. Back then, Apple did not have the necessary technology to create the trendy accessory item known as the Apple AirPods. Prior to the creation of AirPods, Apple created multiple wired earbuds for its consumers to utilize. The first earphone that was created by Apple in 2001 was never given a specific name but is known as the earphone of the first iPod. This product was impressive during that time period due to its white color and the fact that it could play “1,000 songs in your pocket” thus making it very convenient to carry around (Pruitt-Young, 2021). Eventually, in 2007, Apple released another earphone known as the Apple In-Ear Headphones that was able to connect to the iPhone using a headphone jack. The sound quality received from earphones was much better than the previous earphone, however, it had the issue of having tangled cords all the time (Chen, 2019). Apple strived for better quality earphones and released a premium version of the previous In-Ear Headphones with silicon ear tips (Chen, 2019). The purpose of these tips was to minimize sound from outside sources to enhance the noise coming from the earbud. Compared to all the previous earphones, Apple’s release of the EarPods in 2012 had multiple changes that made it more effective. The design of the EarPods was altered to fit more consumers’ ears comfortably and the audio quality was much better than the previous earphones. In addition, the option to control sound and Siri on the wires were much bigger making it easier to use. Only four years later in 2016, Apple released its first wireless earphones called AirPods (Chen, 2019). Many consumers preferred this as wired

earphones could get tangled and be obnoxious to use while connecting immediately through Bluetooth was optimal for many of its users.

Figure 1

Apple AirPods



(Apple, 2021)

Figure 2

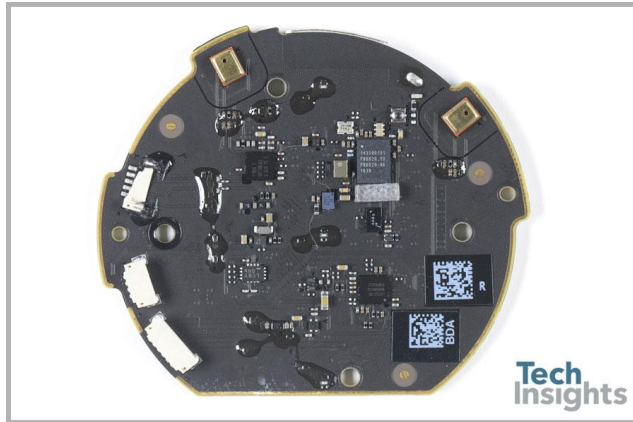
Interior parts of the Apple AirPods



Consists of:

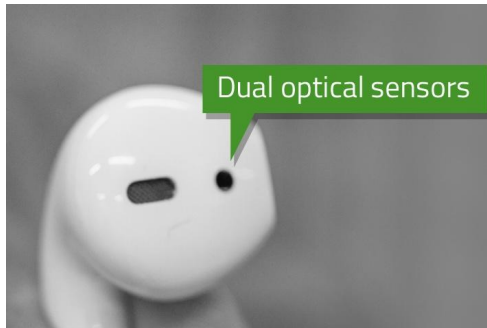
- W1 Chip
- Dual optical sensors
- Antenna
- Battery
- Dual Accelerometers
- 2 Microphones

(Airpods, 2016)

Figure 2*Apple W1 chip*

(Morrison & Yang, 2017)

The W1 chip is designed and created by Apple using silicon. The W1 chip is in charge of connecting to devices through Bluetooth immediately after the AirPods are on. After the first connection, this chip will recognize the device for future Bluetooth connections. The main features of the W1 are to balance the syncing of the two AirPods and the source that is sending the audio. This chip can also determine whether the user has removed one or both AirPods from their ears by utilizing the dual optical sensors, which pause any audio coming from the source (Profis, 2017).

Figure 3*Dual optical Sensors*

(Panzarino, 2016)

The dual optical sensors can detect whether one or both of the AirPods are inside the consumer's ears. These sensors can determine if the AirPods are touching something other than the user's skin (Heisler, 2016). If the AirPods are out of their ear, then these sensors will collaborate with the W1 chip to pause the audio.

Figure 4*Antenna*

(Airpods Teardown, 2021)

The antenna located inside the AirPods is a 2.4 GHz Bluetooth antenna. 2.4 GHz is a way to measure frequency and represents how far this antenna can transfer data. Bluetooth antennas are

the most essential component in the wireless aspect of the AirPods because they can receive and transfer relevant data to the device from the Airpods (Espen, 2021).

Figure 5

Battery



(Airpods Teardown, 2021)

The battery is essential for the AirPods because it would not be able to function without any charge. The battery is a 93 milliwatt hour battery which is about a 1% charge capacity of an iPhone 7 (Airpods Teardown, 2021). In order to charge the battery, you have to place the AirPods in its charging case. A fully charged AirPods can last anywhere from 4-6 hours depending on how demanding the audio is.

Figure 6*Microphones*

(Airpods, 2016)

There are two microphones in an AirPods, one is located near the top and is known as the beam-forming microphone. The beam-forming microphone attempts to block out any noise that comes from an external source and it emits audio from the device the consumer may be listening to. The microphone on the bottom of the AirPods is in charge of tasks that involve your voice, so when the consumer is in a voice call with someone else, this microphone picks up the audio and transfers that audio to the other user. In addition, you can give voice commands to Siri while using AirPods (Jasna, 2021). These microphones work with accelerometers in order to ensure that the audio is effective.

Figure 7

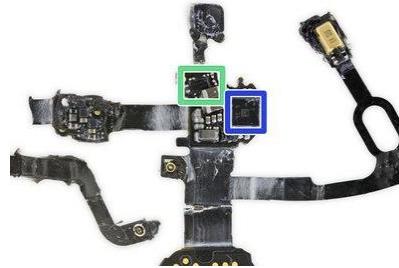
Bosch Sensortec BMA282 accelerometer



(Airpods Teardown, 2021)

Figure 8

STMicroelectronics accelerometer/gyroscope



(Airpods Teardown, 2021)

There are two accelerometers located behind the W1 chip. In figure 7, the accelerometer is highlighted in sky blue, while the other accelerometer is highlighted in dark blue in figure 8. Accelerometers can determine how many times it has been tapped (in the area under the W1 chip) to turn on Siri and pause or continue audio. The STM gyroscope determines the motions of the consumer's head when it moves and the location of the device so that the sound is able to be received and directed back at the device. In addition, the accelerometers work like microphones because they can cancel any external noises and act as a microphone for audio.

Conclusion

Overall, the Apple AirPods have many incredible features that made it a successful and trendy accessory for many of its consumers. The AirPods reduced the number of issues that previous Apple earphones have such as the need for wires and improving the audio quality. There are many features of the AirPods that make it very convenient for their consumers to use. When consumers open their charging case, the W1 ensures that AirPods automatically connect to the device that has Bluetooth on. Optical sensors pause audio just by simply taking an AirPods out of their ears and putting it back in to resume. Batteries and microphones are essential for AirPods because they allow audio to be played and allow audio to transfer through voice calls and even Siri. Prior to the release of AirPods, Apple's earphones required a button tap, however, no matter where the user is, they can expect Siri to respond just by saying "Hey Siri". While the Bluetooth antenna is effective in transferring signals or data between the device and the AirPods. Lastly, the accelerometers are used to ensure that the sound is not affected by the position of your head or the device. Thus all parts of the Apple AirPods 1 play a major role in making this product effective. However, AirPods still have many flaws because there are multiple bugs to using this product. Occasionally AirPods would fail to connect through Bluetooth, so people would have to reset Bluetooth or place the AirPods back into its case and put them back into their ears. Other times, there would be audio issues, but Apple has continuously been improving their earphone products to satisfy their consumers.

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[mic/#:~:text=The%20second%20microphone%20on%20AirPods,which%20listens%20y](https://www.electronicshub.org/do-airpods-have-a-mic/#:~:text=The%20second%20microphone%20on%20AirPods,which%20listens%20y)

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born

Self Reflection

While I was typing the technical description of the Apple AirPods 1, I realized that there are many different components that make up many items that we use today. In addition, the audience may not always know what I am referring to or what certain terms mean, so I will have to be more thorough by using simpler terms or briefly explaining the terms in order for them to understand. I also used many sources to help me better understand these different components, otherwise, I may have explained these terms poorly. I will definitely use all of these ideas I have learned while typing and researching the AirPods.

I noticed that I was able to formulate and articulate and stance while I was typing this assignment. When I was taking the audience's perspective in mind, I noticed that I had to be more thorough with my writing and really explain why I thought the AirPods were a marvelous innovation compared to its previous earphones in my conclusion. I often used multiple sources from the internet and integrated and paraphrased many of my sources to ensure that my technical description was as accurate, informative, and simple for my audience.