

What is active noise cancellation (ANC) technology? How does it work?

Learn about active noise cancellation (ANC) technology and how opposing sound waves effectively eliminate background noise. Check it out now to choose the right headphones for you.

You're focused on climbing the ranks or need a quiet space to code, but ambient noise distracts you. This is where ANC technology on audio devices comes in handy. Let's explore what active noise cancellation (ANC) is and how it works in the following article from GearVN.

Key points

1. ANC (active noise cancellation) technology uses microphones and sound waves in opposite phase to cancel out noise from the external environment.
2. ANC helps protect hearing, enhances concentration, and allows you to fully enjoy the details of the sound.
3. Gamers should choose ANC headphones with a 2.4GHz connection to ensure low latency, avoiding Bluetooth when playing competitive games.
4. Consider the higher cost, faster battery drain, and initial ear discomfort when deciding to buy ANC headphones.

1. What is ANC technology?

1.1. Basic Definition

ANC (Active Noise Cancelling) is an electronic system integrated into smart wearable devices to eliminate ambient noise. This technology uses microphones to detect noise, then generates opposing sound waves to cancel out unwanted sound frequencies before they reach the ear.



ANC technology uses microphones to create reverse waves to cancel out noise.

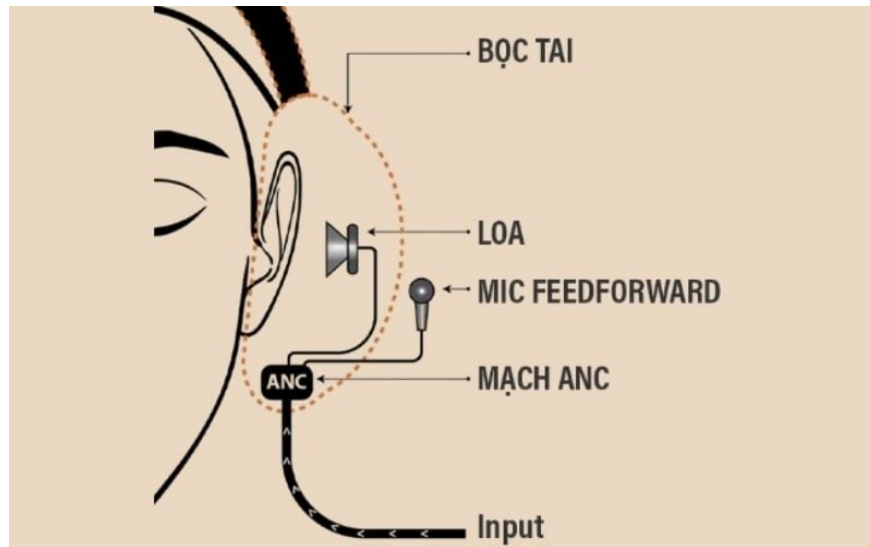
1.2. How ANC technology works

1. **Recording:** The built-in microphones on the headphones continuously pick up background noise and ambient sounds from the surrounding environment.
2. **Signal processing:** Audio data is transmitted to a digital signal processor (DSP) built into the headphones to analyze the frequency and amplitude of the noise.
3. **Out-of-phase wave generation:** The processing chip instantly generates an audio wave that is 180 degrees out of phase with the received noise wave.
4. **Sound intensity cancellation:** **When** original sound waves and sound waves in opposite phase meet, they automatically cancel each other out, allowing users to enjoy a tranquil sound environment.

2. Classification of common ANC technologies in headphones

2.1. Feedforward ANC (Air-Critical Noise Cancellation)

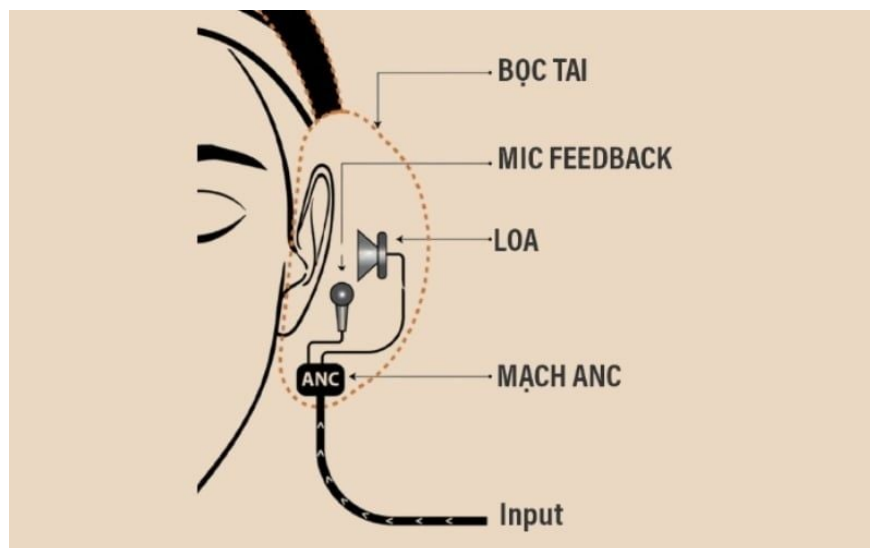
1. **Structure:** The microphone is placed on the outer surface of the earcup or housing to capture noise.
2. **Advantages:** High sensitivity, excellent at handling mid-range noise such as people talking or passing traffic.
3. **Disadvantages:** Poor wind noise cancellation. The externally positioned microphone easily picks up and unintentionally amplifies the whistling wind.



Feedforward ANC places the microphone on the outer surface of the earcup.

2.2. Feedback ANC (Angle Noise Cancellation)

1. **Structure:** The microphone is placed inside the earcup, near the speaker, and directed straight into the user's ear canal.
2. **Advantages:** Accurately reflects what the user actually hears. The system automatically adjusts and continuously corrects noise cancellation errors.
3. **Disadvantage:** Poor handling of high frequencies. If the algorithm is not good, this mechanism can easily produce harsh, ear-piercing feedback.



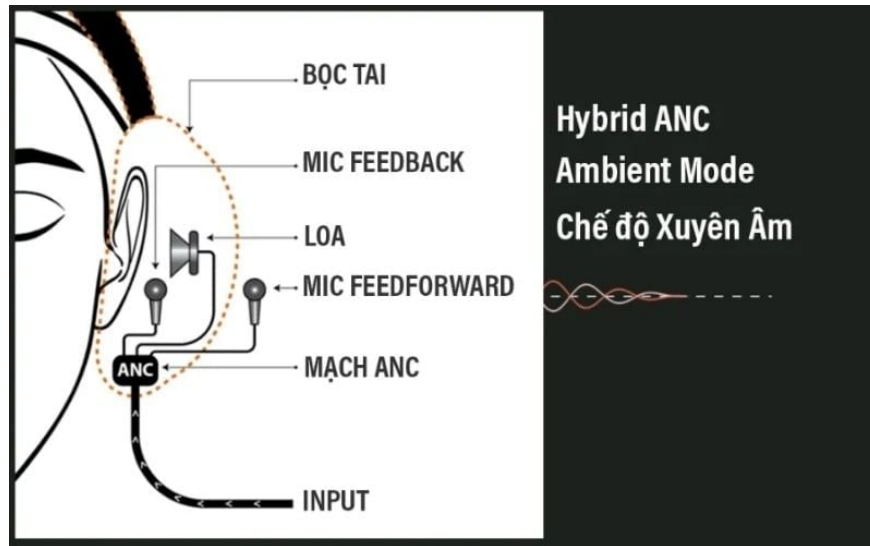
Feedback ANC places the microphone inside the earcup.

2.3. Hybrid ANC (Hybrid Noise Cancellation)

This is a noise-canceling technology that combines the advantages of both types, usually only found in high-end headphones. Hybrid ANC integrates omnidirectional microphones both inside and outside, combining the

advantages of both types.

1. **Noise cancellation capability:** Covers a wide frequency range, effectively eliminating background noise in a variety of environments.
2. **Accuracy:** Minimizes distortion and unpleasant hissing noises.
3. **Disadvantages:** Complex structure, requiring a powerful processor chip, so the device is usually very expensive.



Hybrid ANC incorporates omnidirectional microphones both inside and outside the earcups.

2.4. Adaptive ANC Technology (Adaptive Noise Cancellation)

This is currently the most intelligent noise-canceling technology, capable of automatically analyzing ambient sound and pressure in the ear canal to adjust the noise cancellation level in real time without requiring manual user intervention.

1. **Noise reduction capability:** Flexibly adjust noise reduction intensity to suit specific spaces, from quiet offices to bustling streets.
2. **Comfort:** Minimizes pressure on the eardrum by automatically lowering the noise cancellation level in low-noise environments, resulting in a more natural and comfortable listening experience over extended periods.
3. **Disadvantages:** Requires extremely powerful and energy-intensive processing chips, resulting in products that are typically priced in the high-end segment.



Adaptive ANC technology can automatically adjust the noise cancellation level according to the environment.

3. Differentiate between ANC, PNC, and ENC technologies.

Name	Operating mechanism	Main purpose
ANC (Active Noise Cancelling)	Using out-of-phase sound waves generated by an electronic processing chip to cancel out noise.	It helps the wearer hear the sound clearly in the headphones without interference.
PNC (Passive Noise Canceling)	Passive noise isolation through ergonomic design (thick foam ear cushions, leather ear pads that seal tightly).	Physically block background noise from entering the ears.
ENC (Environmental Noise Cancellation)	Using algorithms to filter out ambient noise transmitted to the microphone during a conversation.	Help the person on the other end of the line (or your teammates in the game) hear your voice clearly.

4. Should you buy ANC noise-canceling headphones?

4.1. Benefits of using ANC headphones

1. **Hearing protection:** You can listen to music at a low volume while still hearing the details clearly, avoiding damage to your eardrums caused by turning up the volume too high to drown out background

noise.

2. **Enhance concentration:** Create a maximally quiet environment for working, studying, or gaming.
3. **A complete audio experience:** Enjoy deep bass and detailed treble without being overwhelmed by the surrounding environment.
4. **Integrated transparency technology:** Easily hear external sounds or conversations without removing your headphones.



ANC headphones help protect hearing and improve concentration.

4.2. Limitations to note

These headphone models are often expensive due to the need for complex components. Continuously activating the noise cancellation feature drains the battery quickly. Additionally, the creation of inverse-phase sound waves generates simulated pressure, which can cause new users to experience mild ear discomfort or dizziness.

5. Do gamers really need ANC noise-canceling headphones?

Gamers should consider headphones with ANC if they frequently play in noisy environments. In eSports games, clearly hearing footsteps is crucial. ANC headphones also help eliminate noise from PC cooling fans or the clicking sound of mechanical keyboard switches.

However, you need to pay special attention to audio latency. For optimal performance, gamers should choose ANC headsets that support 2.4GHz wireless connectivity via a USB receiver, ensuring perfect audio-visual synchronization.



ANC headphones help eliminate noise, allowing gamers to react faster.

6. Criteria for choosing and top brands of ANC headphones

6.1. Choosing based on shape and needs

1. **True Wireless (TWS) earphones:** Compact, versatile, and suitable for constant travel, sports activities, or office work.
2. **Over-ear headphones:** Large ear cushions completely cover the ears, providing good passive noise isolation, and long battery life, making them suitable for gaming, video editing, or intensive music listening.



Compact True Wireless ANC earbuds, ideal for people on the go.

6.2. Supporting technologies and connection standards

Prioritize products with Adaptive ANC technology, which automatically adjusts noise cancellation levels according to the actual environment. Regarding wireless connectivity, the device should support high-quality Bluetooth codecs or have a 2.4GHz dongle to ensure sufficient audio transmission bandwidth.

6.3. Budget and Brand Reputation

1. **TWS (Twist/Wireless) earphones for mobile devices include:** Apple AirPods Pro, Sony WF series, Samsung Galaxy Buds, etc.
2. **Over-ear headphones specializing in Hi-Res audio:** Sony WH series, Sennheiser,.
3. **Over-ear headphones specifically designed for gaming:** Razer, ASUS, Logitech G series, Corsair,.



Sennheiser is famous for its over-ear headphones specifically designed for Hi-Res audio listening.

7. Experience and purchase genuine ANC headphones at GearVN.

GearVN specializes in providing high-end PCs, laptops , PC components (RAM, CPU , SSD, etc.), and gaming equipment (monitors, headphones, keyboards, mice, etc.) to meet all the needs of gamers and technology users. In particular, GearVN stands out with advantages such as:

1. **Diverse products and optimized configurations:** GearVN offers a wide selection from major brands such as ASUS, Razer, Logitech, Akko, HyperX, Corsair, etc. All products are carefully selected.
2. **Competitive pricing and numerous promotions:** GearVN regularly runs attractive promotions and discounts on special occasions. You can easily own your desired device at the best price, along with attractive gifts or flexible installment payment options.
3. **Reliable warranty and after-sales service policy:** When shopping at GearVN, you can rest assured with our clear warranty policy and dedicated technical support team. Our experienced specialists are always ready to advise you on choosing the right product and answer any questions you may have during use.
4. **Convenient shopping experience:** Whether you want to experience our products in person at our showrooms or shop online through our website with fast delivery service, GearVN offers maximum convenience.

GearVN contact information :

1. **Website :** gearvn.com
2. **Hotline :** 1900.5301



Buy reliable, high-quality headphones at GearVN.

8. Frequently Asked Questions about ANC Headphones

8.1. Are active noise-canceling headphones harmful to the ears?

No. On the contrary, this feature provides excellent hearing protection because you don't need to turn the volume up to maximum to drown out ambient noise, thereby reducing direct pressure on the eardrum.

8.2. Does turning on ANC drain the headphone battery?

Yes. Maintaining continuous microphone recording and the DSP chip processing phase-inverted sound waves consumes energy, reducing overall battery life by approximately 20-30% compared to when this feature is turned off.

See more:

1. What is headphone impedance? A guide to choosing the right headphones.
2. What is stereo sound? What is the difference between stereo and mono?
3. What is headphone sensitivity? Its meaning and how to choose the right headphones.

ANC technology delivers a high-quality sound environment, enhancing concentration and protecting hearing. To find the perfect noise-canceling headphones for your needs, contact our hotline or visit gearvn.com for detailed advice and a hands-on product experience.

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