

# How do sleep trackers work?

A sleep monitor, whether a ring, wristband, headband, or smartphone app, can be a great way to measure sleep quality.

A good night's sleep is essential to have enough energy to function the next day. And today, many people understand that it's not just a matter of 'enough 8 hours' but also the quality of sleep. This is one of the reasons why sleep trackers are becoming more and more popular.

A sleep monitor, whether a ring, wristband, headband, or smartphone app, can be a great way to measure sleep quality. But have you ever wondered how they work? Below is a breakdown of how these tech devices work.

## Track your movements

Sleeping involves more than just closing your eyes. There are different stages of sleep: Stage one, stage two, stage three (deep sleep) and REM (rapid eye movement).

Your muscles become more relaxed as you go through different phases, meaning the deeper you sleep, the less you move. And both contactless and wearable sleep trackers can infer how deeply you sleep based on how much you move during sleep. A part of a sleep tracker called an accelerometer monitors this movement.

## Heart rate monitor



Heart rate, which varies depending on the stages of sleep. And sleep monitoring devices, especially wearables, track sleep levels using this metric.

Although your muscles and extremities are inactive during REM sleep, many activities, such as dreaming, still take place in the brain. As a result, the body must balance the effects of the sympathetic and parasympathetic nervous systems. The sympathetic nervous system controls the body's response to relaxation, while the parasympathetic nervous system controls the body's response to danger (fight or flight).

The simultaneous existence of these contradictory states causes an irregular heartbeat during REM sleep. This is not the same as deep sleep, when the heart rate is more regular because not much is happening in the brain. So, by monitoring HRV, a sleep monitor can tell what stage of sleep you're in and how well you're sleeping.

## **Using Photoplethysmography (PPG) in HRV . monitoring**

The sleep monitoring device records heart rate changes using Photoplethysmography (PPG), a method of checking blood volume and circulation through the reflection of light. These trackers have PPG sensors that identify changes in blood flow and changes in heart rate.

PPG sensors project infrared light onto the skin and monitor how blood under the skin reflects the light. And what controls the reflection of light is the amount of blood flowing into the capillaries. So, by looking at how infrared light is reflected, a sleep monitor can note the time between each heartbeat and figure out the quality of sleep.

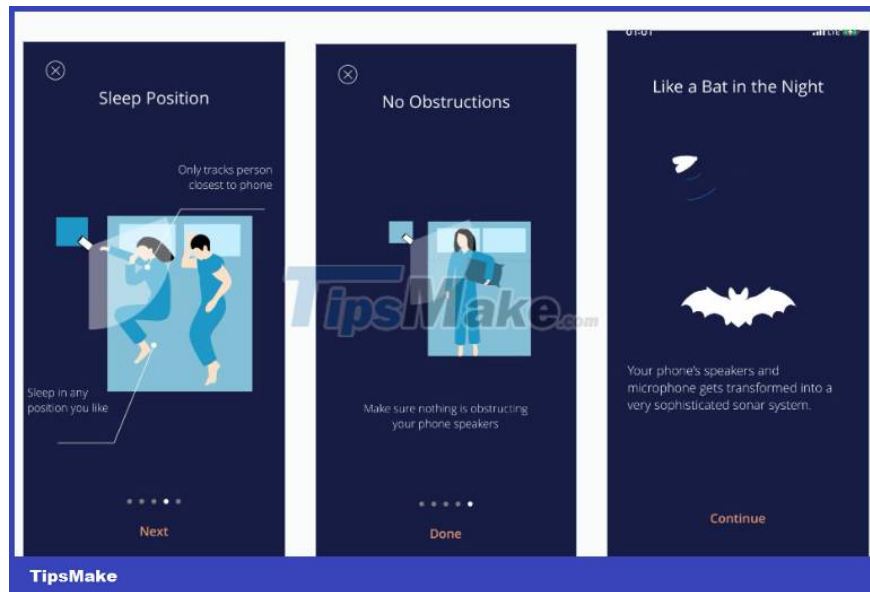
## **Pulse Ox in a wearable sleep tracker**

Pulse Ox is a non-invasive method to determine a person's oxygen saturation level. Low oxygen saturation levels during sleep (hypoxia) can indicate symptoms of sleep apnea, such as night sweats, night urination, and choking. These make sleep quality lower and affect health.

The sleep monitor uses Pulse Ox to determine oxygen saturation levels using a sensor to shine light on the skin. They then measure how much light the blood beneath the skin absorbs. The Pulse Ox Bluetooth meter uses a similar mechanism.

The sensor emits two wavelengths of light. Oxygenated blood absorbs one wavelength, while deoxygenated blood absorbs the other. So your wearable sleep tracker will measure blood oxygen saturation by calculating the difference in absorption of both wavelengths. If your oxygen saturation levels are low, your sleep quality will likely be too.

## **Noise and temperature factors**



Sleep tracking apps have many pros and cons. One advantage is that they have microphones and thermometers to collect noise levels and temperature respectively. Wearables also use this mechanism to analyze the sounds people make while sleeping, such as snoring and loud breathing. These sounds can vary depending on a person's sleep stage.

During REM sleep, the breathing rate is slightly erratic due to all the brain activity. Also, breathing is a bit more regular during deep sleep. Sleep tracker can detect sleep quality by these sounds.

What about the temperature? Both your body and room temperature play an important role in how well you sleep. When your day is over and you're about to go to bed, your body temperature will be lower. In the same way, higher body temperature is associated with light sleep or the time before awakening. Lower heat levels are also linked to melatonin, the hormone that controls sleep.

The lesson learned is simply that if your room or body temperature is too high, chances are your deep sleep will be affected. Again, this is one of the less precise mechanisms that sleep trackers use, as other factors, such as bedding, can affect temperature.

## How accurate are sleep trackers?

Sleep trackers are not completely reliable because their technology has many limitations. For example, a device that uses motion to track sleep may mistake being completely still for sleep. In addition, other factors can influence changes in heart rate, noise, and temperature.

So while you should have a sleep monitoring device or continue to use it if you find it helpful, polysomnography is a more accurate means of monitoring sleep quality. It's what medical professionals use to diagnose sleep disorders and prescribe treatment. However, sleep tracking is still a good way to estimate how well you sleep from day to day.

You finished reading the article "**How do sleep trackers work?**" edited by the [TipsMake](#) team. We hope this article has provided you with many useful tech tips and tricks. You can search for similar articles on tips and guides. Thank you for reading and for following us regularly.

