

Scientists create noise-cancelling windows that can reduce sound by up to 50 per cent

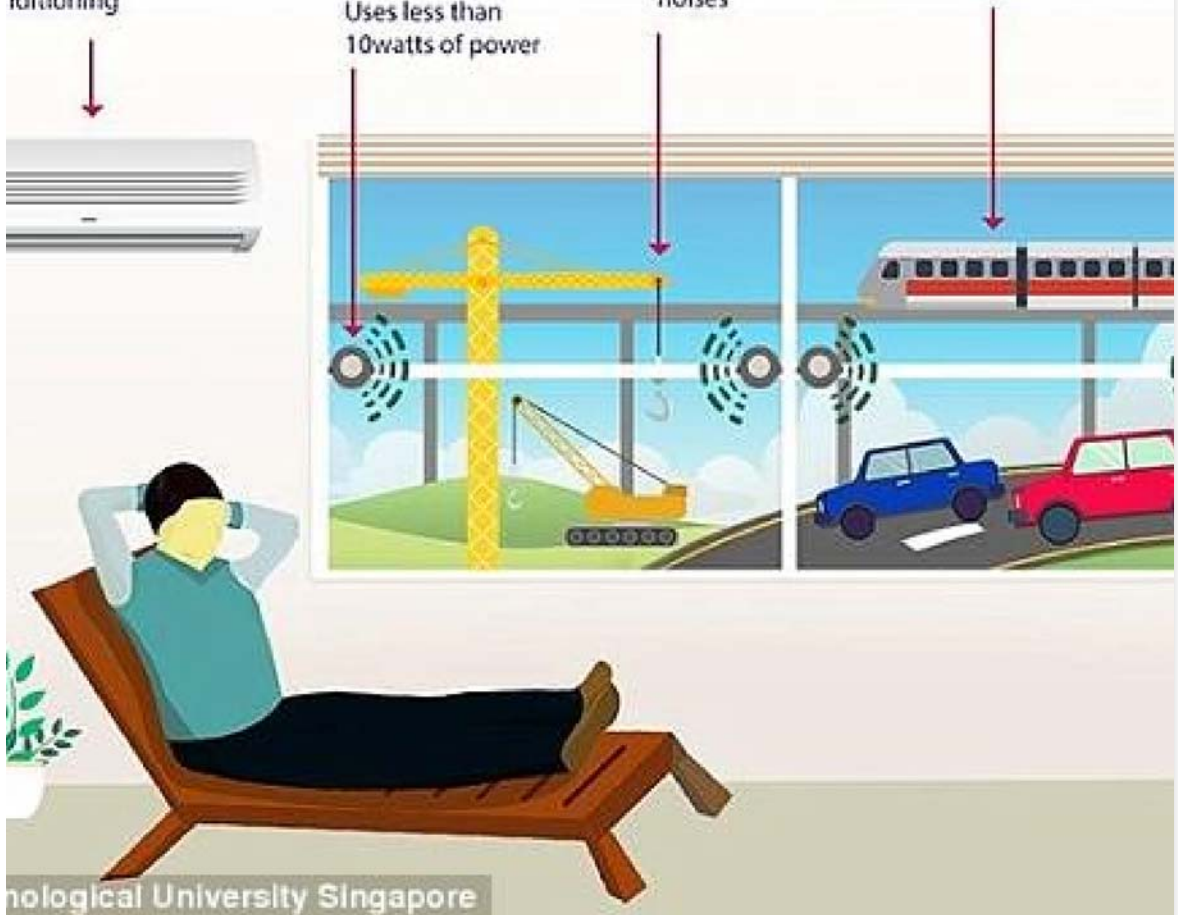
## Smart Window Noise Cancellation Technology

1. Cooler with fresh air, reducing the need for air conditioning

2. Reduces up to 50% of noise pollution  
Uses less than 10watts of power

3. Keeps out construction and heavy machinery noises

4. Keeps out noise and passing train



A window that can reduce noise pollution by 50 per cent, even when open, has been unveiled by scientists.

The prototype device is likely to be a boon to anyone living under a flight path, busy road or living beside noisy neighbours.

It uses 'active noise control' technology – found in many high-end noise cancelling headphones – that has been adapted to work in a large open area.

generates matching 'anti-noise' in real-time

The device is the work of researchers at Nanyang Technological University (NTU) in Singapore, in conjunction with the University of Southampton and Tottori University in Japan.

Designed to be mounted on window grilles, the gadget uses 'active noise control' technology that emits a sound-wave that cancels out incoming noise.

The researchers say that windows can be left open for fresh air without disturbance from external noise pollution.

This in turn reduces the need for air-conditioning to keep the interiors of buildings and homes cool.

Several units are placed together to form an array on a window grille which will act together to reduce external noise.

Each unit is equipped with a microphone and is able to detect noise before it reaches the window – and generates a soundwave that is out of phase with the incoming sound wave. This cancels out the sound.



A device that can reduce noise pollution entering buildings even while windows are wide open has been created by researchers in Singapore. Designed to be mounted onto window grilles, it promises to reduce up to 50 per cent of noise coming from nearby

The device, currently at the prototype stage, uses eight watts of power – similar to a small portable Bluetooth speaker.

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Researchers are working to further improve the technology's noise cancellation efficiency, making them smaller and more cost-effective to produce.



When both outside noise and anti-noise converge they cancel each other out, resulting in a softer ambient sound entering living spaces. Experts conducted tests on the technology using a soundproof chamber that houses a mock room with windows and doors

## **HOW DOES ACTIVE NOISE CONTROL SOUND-CANCELLING TECHNOLOGY WORK?**

Active noise control is found in high-end noise cancelling headphones and promises to reduce the amount of ambient sound entering a wearer's ears.

Each headphone speaker is equipped with a microphone, which enables the system to detect the waveforms of sounds entering them.

It then generates an exact match for these sound waves, which is then inverted.

When these two opposite signals meet, it cancels out the offending outside sounds.

Some systems claim to be capable of reducing noise by up to 90 per cent, although this may be as low as 50 per cent in some models.

The technology has existed for several decades, but has relatively recently been used in commercial headphones.

Even more recently, it has begun to be applied in industrial and other public situations.

Full size speakers equipped with the technology is used to cancel out the disruptive noises of transformers, compressors and other low frequency machinery.

A number of institutions are also working on ways to incorporate it into residential and commercial buildings, like homes, shops and offices.

Professor Gan Woon Seng, director of NTU's centre for infocomm technology, who led the research, said: 'Compared to noise cancellation headphones, what we have achieved is far more technically challenging as we needed to control the noise in a large open area, instead of just around the ear.

'Our innovation not only computes the right amount and type of "anti-noise" to emit, but also does it faster than the detected noise can reach inside the building.

'We are currently finding ways to improve the technology further so that it can be used not only at window grilles with large openings, but also provide a cost-effective solution that can be easily installed and replaced.



Several units are placed together to form a grid-like array on a window grille to reduce external noise by emitting 'anti-noise' signals. Researchers are working to further improve the technology's efficiency, making them smaller, more cost-effective to produce

The research team conducted tests on the technology using a soundproof chamber at the university's labs, which houses a mock room with windows and doors – resembling a typical room in a home.

Various recorded sounds from construction sites, jet engines and trains were used as noise sources during the tests.

'Ultimately, we aim to integrate this technology into window grilles that can help mitigate urban noise pollution conveniently,' said Professor Seng.