NEWS IN FOCUS

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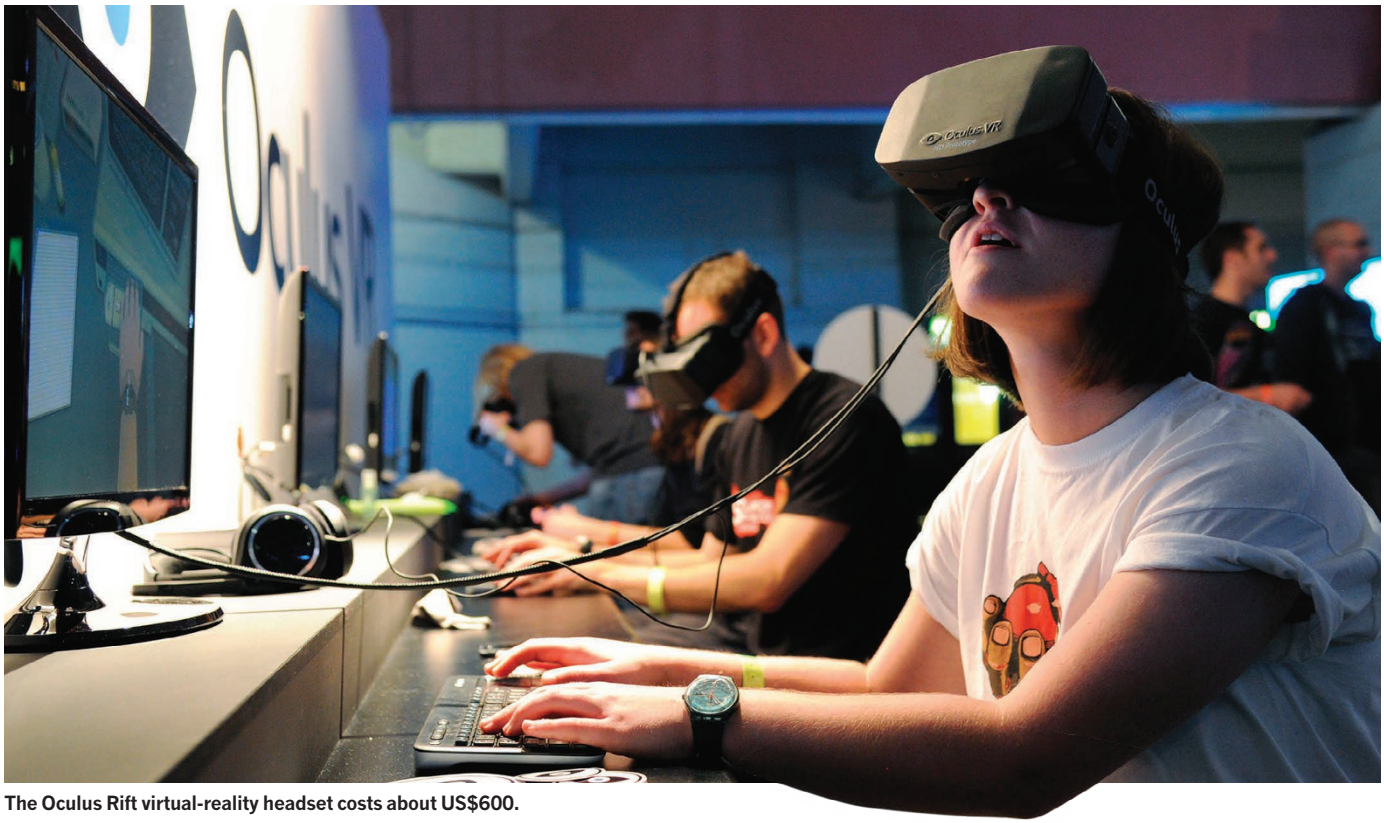


The Oculus Rift virtual-reality headset costs about US$600.

TECHNOLOGY

Low-cost headsets boost virtual reality's lab appeal

A wave of user-friendly devices is making the technology an attractive research tool.

BY DAVIDE CASTELVECCHI

Devices that have slashed the cost of virtual reality, and transformed its performance, have implications for scientists as well as gamers. Researchers who are experimenting with the head-mounted displays say that they have the potential to find widespread use as a research tool.

Virtual reality (VR), which lets users experience a computer-generated, three-dimensional world, has produced recurring waves of hype since the 1980s — but this time could be different, says Mel Slater, a computer scientist at the University of Barcelona in Spain who has worked in the field for two decades. Thanks to technologies originally developed for smartphones and video-gaming graphics, the performance of these headsets is now comparable to that of high-end devices that cost tens of thousands of dollars. They are sophisticated, affordable and user-friendly enough to become a staple of research labs, says Slater, rather than tools available to only very few researchers.

A gadget that has transfixed technology-news outlets is the Oculus Rift, made by Facebook-owned start-up Oculus VR of Menlo Park, California. It costs US$600 — but operating it also requires a high-end computer that can cost more than $1,000. Similarly priced gadgets made by smartphone-maker HTC and Sony are expected to become available this year. Vastly cheaper sets made by Google and Samsung turn a smartphone into a more basic VR device.

A lab can now buy a VR device without a dedicated equipment grant, says Anthony ▶

Steed, a computer scientist who heads a virtual-environments group at University College London.

He and Slater have been experimenting for more than a year with early prototypes of the HTC and Oculus devices, and say that the performance is just as good as that of higher-end devices, and getting better. The new devices are light enough to be worn for extended periods, and they react quickly to the user's movement, preventing the motion sickness that can occur when using VR. "Two to three years ago, the lab we used for our research cost €100,000 [US$114,000] to set up. Now we can do the same for about €4,000," says Slater.

For years, Slater has run VR experiments with psychologists, including one that tested how white people's biases change after they have virtually inhabited the body of a black person.

Last week, Slater and Daniel Freeman, a clinical psychologist at the University of Oxford, UK, and their collaborators published a study that suggests that VR could help to treat people with severe paranoia, who often avoid crowded places because of a perception that other people want to hurt them (D. Freeman *et al. Br. J. Psychiatr.* http://doi.org/bgrr; 2016). The experimental therapy attempts to teach people to lower their defences and to trust others by letting them visit virtual environments such as crowded lifts or underground trains.

Other studies have used VR to try to treat post-traumatic stress disorder and fear of heights or spiders. These experiments used expensive, high-end gear, but several of the researchers involved say that they now plan to start using consumer headsets instead.

As well as being cheap, the headsets are simple to set up. "It's a proper out-of-the-box experience," says Steed. If larger studies prove the therapies to be effective, patients could borrow the equipment and use it at home, Freeman says.

Neuroscientist Elizabeth Buffalo at the University of Washington in Seattle is also considering how to use the Oculus Rift. Her team studies monkeys as the animals explore interactive environments that are represented on a screen. Head-mounted sets that create a 3D environment would create a more immersive, and therefore natural, experience, she says, but current products are too big to fit on a monkey's head. "We are working on hacking the Oculus to achieve this," Buffalo says.

Creating complex virtual environments still requires specialized computer skills, says Slater. But costs are falling now that some software developed to aid video-game companies is free to use, and many labs outsource the work. A related technology called augmented reality (AR), which superimposes images onto the user's field of view rather than replacing the scene with a different one, could also be of use in the lab, helping researchers to visualize and share data sets, says Mark Billinghurst, who studies human–computer interaction at the University of South Australia in Adelaide.

Google Glass, an early attempt at AR that projected images into the corner of a pair of glasses, was a commercial flop, but Microsoft is about to launch a more sophisticated AR headset called HoloLens. "With AR technology like HoloLens," says Billinghurst, "researchers could easily see a complex virtual data set superimposed on a real table in front of them, and also see each other face to face across the table and talk about the data."

Mary Whitton, a computer scientist who works on virtual environments at the University of North Carolina at Chapel Hill, says that there is still room for improvement in the way the systems track users' motions and in how users can interact with the virtual world using their hands. Still, she says: "I've had most fun seeing how people use what we've built in ways we never imagined." ■

GENOMICS

Gene variants linked to education prove divisive

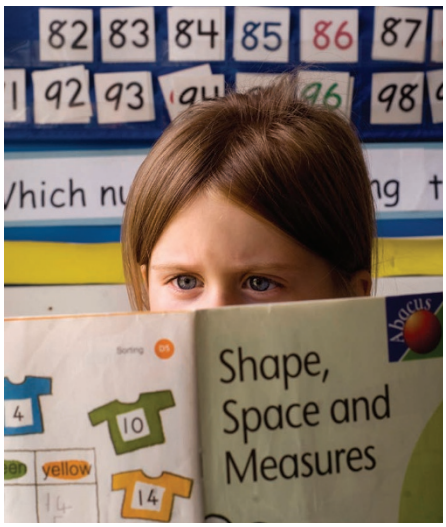
Study uncovers 74 genetic markers that influence the number of years spent in education.

BY ERIKA CHECK HAYDEN

The largest-ever genetics study in the social sciences has turned up dozens of DNA markers that are linked to the number of years of formal education an individual completes. The work, reported this week in *Nature*, analysed genetic material from around 300,000 people.

"This is good news," says Stephen Hsu, a theoretical physicist at Michigan State University in East Lansing, who studies the genetics of intelligence. "It shows that if you have enough statistical power you can find genetic variants that are associated with cognitive ability."

Yet the study's authors estimate that the 74 genetic markers they uncovered comprise just 0.43% of the total genetic contribution to educational achievement (A. Okbay *et al. Nature* http://dx.doi.org/10.1038/nature17671; 2016). By themselves, the markers cannot predict a person's performance at school. And because the work examined only people of European ancestry, it is unclear whether the results apply to those with roots in other regions, such as Africa or Asia.



TIM SMITH/PANOS

Genetic differences explain just 3.2% of the variation in educational achievement between people.

The findings have proved divisive. Some researchers hope that the work will aid studies of biology, medicine and social policy, but others say that the emphasis on genetics obscures factors that have a much larger impact on individual attainment, such as health, parenting and quality of schooling.

"Policymakers and funders should pull the plug on this sort of work," said anthropologist Anne Buchanan and genetic anthropologist Kenneth Weiss at Pennsylvania State University in University Park in a statement to *Nature*. "We gain little that is useful in our understanding of this sort of trait by a massively large genetic approach in normal individuals."

The study is the latest to apply genetic