**Blind people ‘see’ microscope images using touch-feedback device**

How do you study a blood cell if you can’t see it? You feel it, using a device that translates scientific data into tactile information.

“We want to help people that are blind or visually impaired and studying science,” says [Ting Zhang](https://engineering.purdue.edu/DuerstockIAS/people/ptProfile?resource_id=145661&group_id=145602) at Purdue University in Indiana. Her team has developed a system that uses a [haptic device](https://www.newscientist.com/article/mg17823925-300-the-word-haptics/) – an interface that gives you feedback you can touch or physically feel – to let people interpret visual information using their hands.

This sophisticated joystick is hooked up to a computer connected to a microscope. You move the joystick to explore microscope images – in this case, blood smears. The joystick pushes back against your hand when you hover over the wall of a blood cell, and vibrates to simulate different textures.

In tests with people who are blind or wearing a blindfold, participants could differentiate between red and white blood cells using the sensory feedback. “They were able to get meaningful information about the texture, shape and colour of the objects in the image without being able to see them,” says Zhang.

The system uses computer vision algorithms to extract important features from an image, such as the position of the cell walls. It then reconstructs the image virtually, so the user can interact with it via the haptic device.

**Touch and go**

There are already many ways to [help people with visual impairments read text](https://www.newscientist.com/article/2112210-tiny-fingertip-camera-helps-blind-people-read-without-braille/), ranging from braille to text-to-speech software, but interpreting other forms of visual information can be difficult. At the moment, the most common way for a person with visual impairment to learn the layout of something like a blood cell is to use paper with bumps to represent different parts of the image. But this requires someone to label the salient features of the cell and input it into a computer program to convert it into a textured printout.

“This is time consuming and relies on having a non-visually-impaired person to process the data,” says Zhang. Her team’s system, however, allows people with visual impairments to interpret images from a microscope in real-time. In tests, people were also better at distinguishing between red and white blood cells using the new system than they were when using tactile paper.

“Interpreting scientific data can be hugely difficult for someone with visual impairment,” says Dolores Conroy at [Fight for Sight](http://www.fightforsight.org.uk/about-us/), a UK sight-loss charity. “Trying to solve this problem is a very hot topic and this sounds like a really exciting approach.”

Zhang hopes research in this area will encourage more people with visual impairments to study science. “Few blind people choose to take science subjects,” she says. “We want to make it easier for them to do so.”