

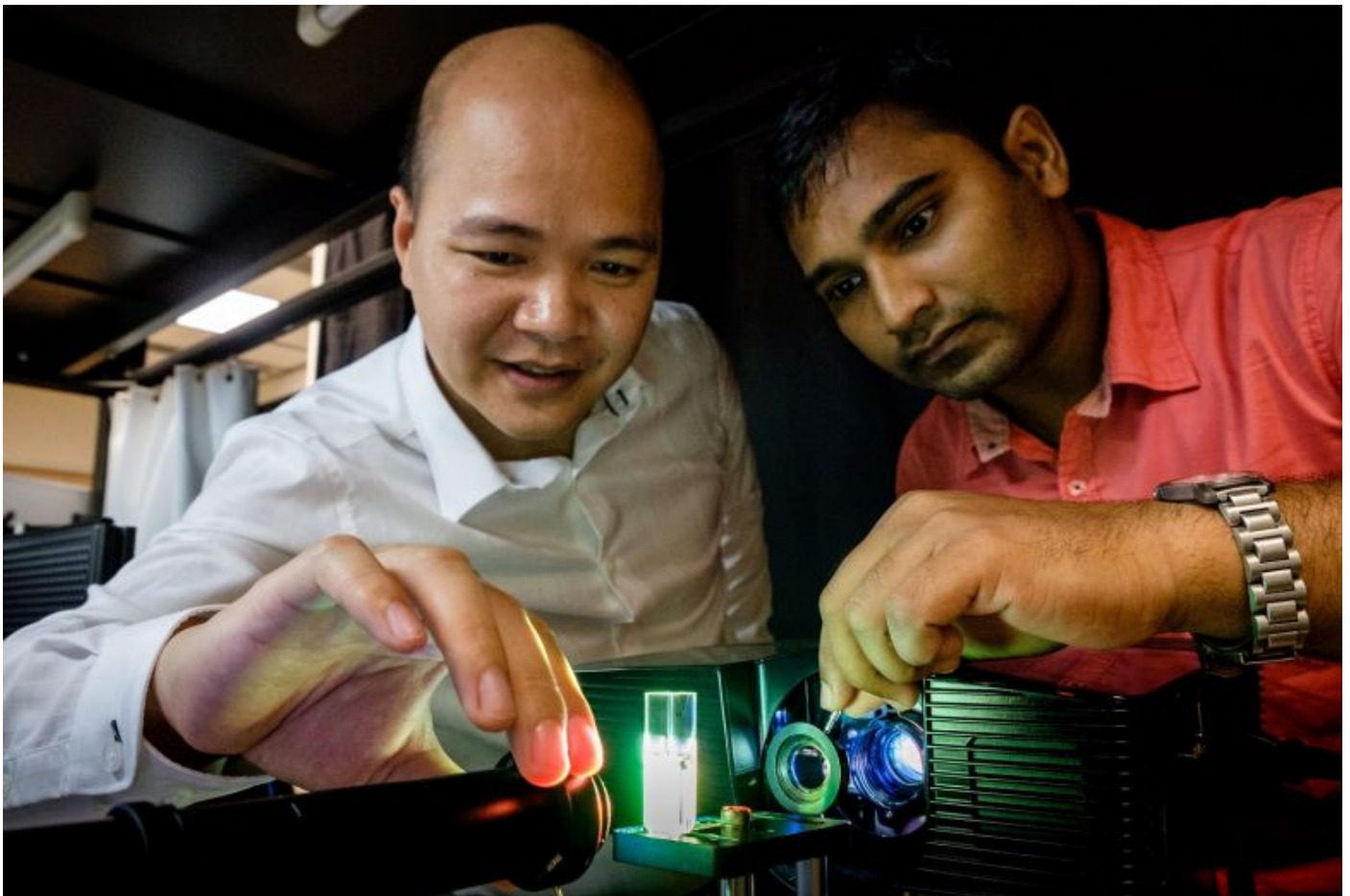
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NTU scientists develop new lensless camera technology



Assistant Professor Steve Cuong Dang (left) with Dr Sujit Kumar Sahoo doing an experiment with the ground glass camera. PHOTO: NTU

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SINGAPORE - A lensless camera that can capture sharp, multi-coloured images without lens or colour filters has been developed by scientists from Nanyang Technological University.

In contrast to existing camera technology, which can capture up to 36 colour channels, this new technology - which uses only a piece of ground glass and a monochrome sensor - can detect an infinite number of spectrums within a single image.

The camera uses speckle patterns instead of conventional colour filters to detect and display the different spectrums within an image that are not visible to the naked eye. As a result, an infinite number of spectrums - including UVR (UV Reflected), UVF (UV Fluorescent), IR (Digital Infrared), and VIS (visible) - can be captured at once.

Due to its ability to capture different spectrums within an image, the new camera may potentially be used in forensics or food safety, said Dr Sujit Kumar Sahoo, one of the researchers behind the project.

"For instance, it could be used for food safety, where one can take a photo of fruits or meat in particular spectra to look for spots that are associated with chemicals or bacterial activity leading to spoilage," he added.

It could also be used to verify the authenticity of artworks by capturing the different layers of paint not visible to the naked eye, or in the pharmaceutical industry as a cheaper and more flexible option to hyperspectral cameras, which are currently used for quality control of drugs.

Currently, a spectrometre, an apparatus that can split light into separate colours, is used to detect different spectrums within an image.

But it is expensive. The cost of a commercial spectrometre can range between S\$3,000 and over S\$40,000, said Assistant Professor Steve Cuong Dang, who led the research.

In contrast to existing spectrometres, this new technology is far simpler, more flexible and more cost-effective, he explained.

"We replace all the expensive parts of the spectrometre like the lens and the grating inside," he said. "Here, we just have a piece of frosted glass at the front of the camera. We don't have anything else."

The researchers did not elaborate on how much cheaper it will be but Prof Dang said the new technology could also potentially be used in smartphones and even DSLRs, to help make them slimmer by reducing the need for bulky and expensive lens and colour filters.

"It would also allow people to have access to a range of colours that ordinary cameras may not be able to capture," he added.

The innovation has received interest from a number of pharmaceutical companies and small-medium enterprises, said NTU. A patent for the technology was submitted last year and is currently pending.