

## Popular Science Abstract

WILL YOU BE ABLE TO SEE DNA WITH YOUR PHONE IN THE FUTURE?

Can you do me a favor and picture a microscope? Got it? Great. Can I guess that the microscope you imagined looked something like the one shown in figure 1. A super technical manifestation of over 300 years of research. Can you do me another favor? Can you imagine transporting this microscope from village to village in the midst of the African jungle? Not the most pleasant thought is it? That is why scientist are currently trying to develop a new method of microscopy that is only using a normal off-the-shelf smartphone and some intelligent algorithms.

The most important characteristic that determines the quality of a microscope is its resolution. The resolution of a microscope is given as a distance and it indicates the closest two individual objects can get while still being distinguishable. The resolution of a smartphone camera can generally be computed by one characteristic number: the amount of (mega)pixels used by the sensor of the camera. For an image of a given size the resolution is then determined by the size of the image divided by the amount of pixels. This resolution is normally way too low for a smartphone to work as a microscope. However, if the camera records a video where the object you are trying to image is moving less then the pixel size between two consecutive frames of the video then the resolution can be increased. The image sequence that has been recorded can be used to reconstruct a single image of a high resolution which is determined by the product of the time between two consecutive frames and the velocity with which the image you are trying to image is moving and this product can be much smaller than the aforementioned pixel size.

This technology has the potential to revolutionize microscopy by abandoning (almost) all of the bulky, expensive equipment used in a conventional microscope, such as the one shown in figure 1, therefore lowering the costs tremendously and increasing the usability for point-of-care testing enormously.

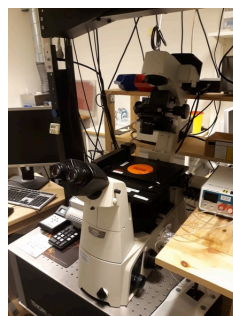


Figure 1: Picture of a conventional microscope