
Instant Haemoglobin Count With Smartphone



By pulling down one's eyelid and assessing its redness, a doctor can identify if the person has anaemia, but to give a precise diagnosis a blood test is needed. New software, however, allows for medical staff to instantly get a near-accurate count of haemoglobin from a picture taken with a smartphone.

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With the [software](#), engineers at Purdue University have transformed the smartphone camera into a hyperspectral imager capable of measuring haemoglobin levels to detect anaemia, acute kidney injury and haemorrhages, or assess blood disorders. The method is based on spectroscopic analysis, a commonly-used technique that detects haemoglobin assessing the level of light absorption. By converting low-resolution smartphone photos into high-resolution digital spectral signals (a technique called spectral super-resolution spectroscopy), a computational algorithm uses these signals to quantify haemoglobin content (see explanatory video [here](#)). With the new technology, there is no need for extra hardware to do the analysis.

The inner eyelid was selected as a sensing site due to high microvasculature visibility there and relative ease of assessment. Furthermore, it is not affected by skin colour, so no personal calibrations are needed.

During a pilot clinical test with 153 participants, each patient took a blood test and a researcher took a photo of their inner eyelid with a smartphone. The results showed that prediction errors for the new software were within 5-10% of those from laboratory testing. The team is now working on incorporating the software into a mobile app, which has features to allow for consistent image quality and provides eyelid-shaped guidelines on the screen.

The technology, though it will not replace a conventional blood test, is non-invasive and provides instant results. It could, therefore, help to reduce the need for in-person clinic visits, improve remote monitoring, and accelerate diagnostics and treatment, especially at a home setting or clinics in low-income countries where access to testing laboratories is limited or unavailable.

The team is also conducting a clinical study that uses the app to assess blood haemoglobin levels of cancer patients.

Patent applications for this technology have been filed, and the researchers are looking for partnerships to further develop the smartphone app.

Source: [Purdue University](#)

Image credit: [Purdue University photo/Vincent Walter](#)

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