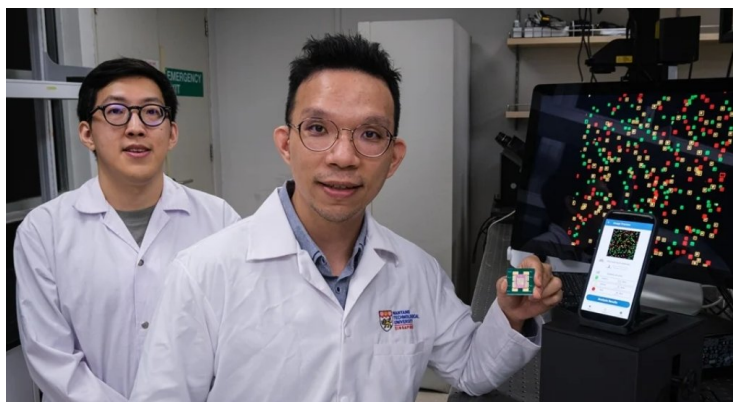


Scientists in Singapore develop AI-powered biochip that detects genetic markers in 20 minutes

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Combining a specially designed nanophotonic chip with AI-automated image analysis



A team of scientists from Nanyang Technological University (NTU) Singapore has developed a new biochip that, when paired with Artificial Intelligence (AI), can detect quickly and accurately extremely small amounts of microRNAs, which are tiny genetic markers linked to diseases such as heart disease.

The new biosensing platform combines a specially designed nanophotonic chip with AI-automated image analysis.

With a tiny drop of blood loaded into the chip, it can rapidly detect multiple microRNA biomarkers. With its integrated AI imaging function, thousands of microRNA signals can be imaged and analysed in a single snapshot.

Compared with the current gold standard of detecting microRNA – PCR (polymerase chain reaction) detects tiny amounts of genetic material by copying them many times, the new device can cut detection time from hours to 20 minutes.

The team has constructed a compact prototype that includes a colour camera that can capture images of the nanophotonic chip, and a mobile phone application designed to analyse images for microRNA using AI algorithms and provide rapid results.

The platform also uses a deep-learning model known as Mask R-CNN to automatically analyse microscopic images.

An automated AI imaging system captures the microRNA signals in one shot, after which the AI system identifies and classifies fluorescent signals and distinguishes between different microRNA types, removing the need for manual counting and reducing human error.

The study was supported by the Singapore Ministry of Education Academic Research Fund Tier 1 grant and the Agency for Science, Technology and Research's Manufacturing, Trade and Connectivity Interdisciplinary Research Grant.

The team will be looking to talk to clinicians and industry to see how they can scale up to do further trials on other microRNA markers.