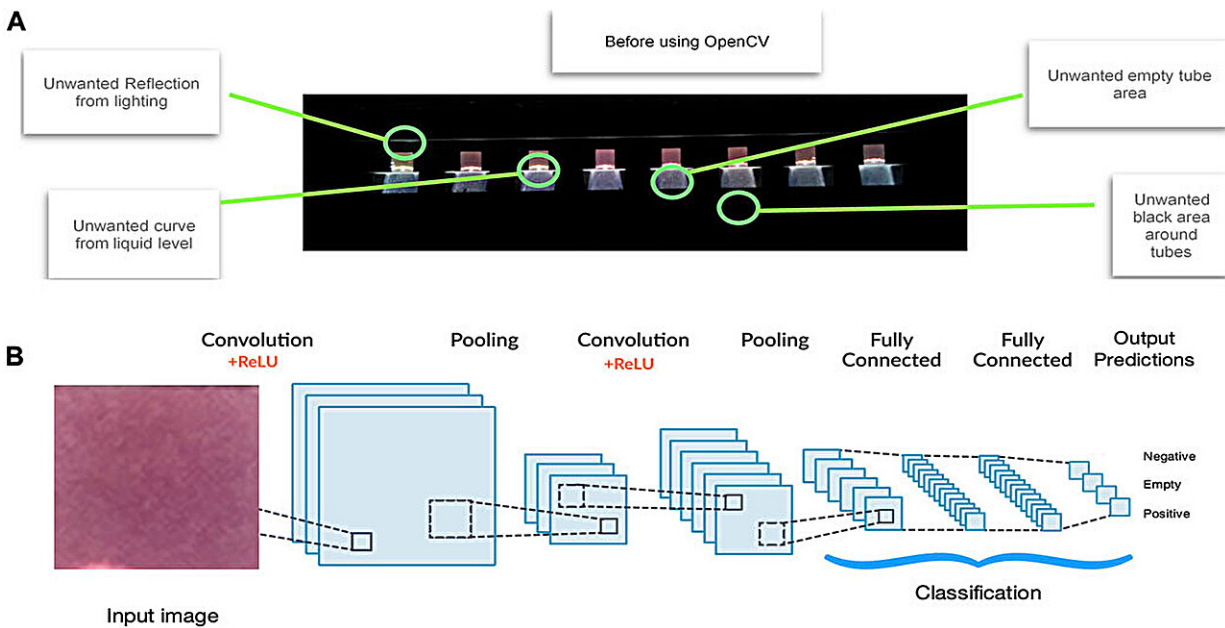


Artificial intelligence used in new COVID-19 test improves accuracy

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Artificial Intelligence method. VIDIIA’s AI solution works in two stages: (A) Tube identification process. The tubes in the image are identified by using an edge detection method (OpenCV) that removes all the unwanted regions such as the empty tube areas, black areas around the tubes, reflection form lighting and curves from liquid levels that could mislead the Artificial Intelligence model. (B) Deep Learning process feature classification. By using over 10,000 images, and growing, as training data, our two-dimensional Deep Learning model (using convolutional neural network) classifies the input images into any of the specified categories: Negative, Positive and Empty. Credit: *Frontiers in Molecular Biosciences* (2023). DOI: 10.3389/fmolb.2023.1144001

A new AI-assisted molecular diagnostic platform capable of identifying variants of COVID-19 and other infectious diseases has been developed by scientists in the UK. The low cost, portable device could play a crucial role in preventing future pandemics due to its accuracy and versatility.

Scientists from the University of Surrey, Brunel University London, and Lancaster University in collaboration with the NHS, GB Electronics (UK) Ltd and Vidiia Ltd, have created the platform known as VIDIIA Hunter (VH6). It uses reverse transcription loop-mediated isothermal amplification (RT-LAMP) technology in combination with an [artificial intelligence](#) (AI)-based deep learning model. The AI model has been trained to read the results of tests identifying [infectious diseases](#), including COVID-19 and removes users' interpretation and errors while improving accuracy.

The work is [published](#) in the journal *Frontiers in Molecular Biosciences*.

Professor Roberto La Ragione, Professor of Veterinary Microbiology and Pathology at the University of Surrey, said, "Lateral flow tests are an efficient way of testing if you have COVID-19, however, there has always been a question mark over their accuracy which has only been heightened with the emerging number of variants now in circulation. As COVID-19 continues to evolve, we need to evolve with it and have highly accurate tests that can be readily used without the need for laboratory facilities."

To confirm the accuracy of VH6 scientists tested 150 COVID-19 positive clinical nasal swabs with a range of viral loads and 250 negative samples provided by NHS Berkshire, Surrey Pathology and Royal Lancaster Infirmary, Lancaster. The test was found to be highly accurate with a detection rate of 98% and a specificity of 100%. Additional testing found the device detected all the COVID-19 variants that have

circulated in the UK since December 2020.

Dr. Aurore Poirier, first and co-corresponding author of the study and Research Fellow B at the University of Surrey, said, "The VH6 diagnostics platform has been approved for COVID-19 testing in the UK, but also has the potential to diagnose current and emerging infectious [disease](#) and antimicrobial resistance. Its portability, rapidity, accuracy, and affordability allow for near patient testing, in all laboratory and health care settings, including low-resources ones. The VIDIIA Hunter therefore has the potential to help control future outbreaks."

To monitor and track the spread of COVID-19 and other infectious diseases, the test is connected to a [smartphone app](#) that allows an operator to manage and track the patients and samples. Results and graphs are displayed on the app in as little time as 20-30 minutes and automatically connects to a cloud. The platform allows near-patient testing and has the potential to detect other infectious diseases such as tuberculosis and dengue fever, and antimicrobial resistance.

Unusually, the test can be used for human and animal health care, which is a crucial step in identifying any future zoonotic diseases that could spread between the two.

Professor Muhammad Munir, Professor of Virology and Viral Zoonosis at Lancaster University, said, "Incorporation of LAMP technology with advanced modules of AI has empowered the earliest, reliable and economical detection of infections, including COVID-19, and holds potential for the detection of diseases in both humans and animals, making it a tool of significant medical importance."

The VH6 has now been approved for [medical use](#) in the United Kingdom under the UK Health Security Agency's Medical Devices (Coronavirus Test Device Approvals, CTDA) Regulations 2022 and is

CE-IVD marked and MHRA registered.

More information: Aurore C. Poirier et al, VIDIIA Hunter: a low-cost, smartphone connected, artificial intelligence-assisted COVID-19 rapid diagnostic platform approved for medical use in the UK, *Frontiers in Molecular Biosciences* (2023). [DOI: 10.3389/fmolb.2023.1144001](https://doi.org/10.3389/fmolb.2023.1144001)

Provided by University of Surrey

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