NTU Singapore Develops New Device to Identify COVID-19

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The Nanyang Technological University of Singapore (NTU Singapore) has produced more advanced COVID-19 tools, hitting another milestone in the country's efforts to combat COVID-19.

A group of university scientists recently developed a laser-powered device that can trap and move viruses using light. Since it can precisely 'move' a single virus to target a specific section of a cell, the device, which can manipulate light to act as 'tweezers,' could contribute to the development of new approaches to disease diagnosis and virus studies.

> **Our invention uses light to manipulate viruses in a certain size range and we have proven that it works with adenoviruses. We believe our device could also be used to trap and concentrate SARS-CoV-2 for research and diagnosis.**
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> **– Professor Liu Aiqun, School of Electrical and Electronic Engineering, Nanyang Technological University of Singapore**

The technology would also benefit vaccine development as it allows scientists to identify damaged or incomplete viruses from a group of thousands of other specimens in under one minute, compared to present techniques that are time-consuming and inaccurate, according to the scientists.

Associate Professor from NTU's Lee Kong Chian School of Medicine, a medical geneticist who co-led the research, said: "The conventional method of analysing viruses today is to study a population of thousands or millions of viruses. We only know their average behaviour as an entire population. With our laser-based technology, single viruses could be studied individually."

In addition to diagnosing diseases, the gadget might be used for various performance measures, such as a single virus with the ability to mutate and cause the next wave of an epidemic. The researchers used adenoviruses to test their gadget, known as a digital virus manipulation chip, which is a type of common viruses that can induce cold-like symptoms and have a diameter of 90 to 100 nanometres (nm). Although it has not yet been tested on coronaviruses, it has the potential to be employed in research on the SARS-CoV-2 virus, which produces COVID-19, due to its similar size of 80 to 120 nm.

The device operates by infusing a virus-containing fluid, such as blood, into a chip. After that, a laser beam is focused on it, creating light spots. The virus is attracted to and trapped in predefined cavities on the chip because the intensity of the light is highest in the centre of the spots. Viruses can freely travel to other sections of the chip by shifting the placement of the light spots. This facilitates the sorting and concentration of viruses ranging in size from 40 nm to 300 nm.

OpenGov Asia reported that a team of scientists from Nanyang Technological University, Singapore had developed a predictive computer model. When tested on real pandemic data would have reduced the rate of both COVID19 infections and deaths by an average of 72% based on a sample from four countries. The model, NSGA-II, could be used to alert local governments in advance on possible surges in COVID-19 infections and mortalities, allowing them time to put forward relevant countermeasures more rapidly.