

Singapore Launches Digital Molecular Analysis Research Centre

Yen Ocampo

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The Institute for Digital Molecular Analytics and Science (IDMxS), which aims to promote the science of analysing biological molecules (biomolecules) using information technology and data science, was recently **established** by Nanyang Technological University, Singapore (NTU Singapore). This could pave the way for real-time environmental or health data monitoring and analysis, like how real-time traffic data can be obtained on mobile devices.

IDMxS, NTU's newest national Research Centre of Excellence (RCE), is funded with a total investment of over S\$160 million over 10 years, with the majority coming from NTU and the National University of Singapore and S\$94 million coming from the Singapore Ministry of Education.

Digital molecular analytics, a novel scientific discipline that analyses individual molecules to discover, identify, and measure biomolecules with extraordinary accuracy, is at the core of the work done at IDMxS.

Such a science will open many new areas of research, such as the creation of diagnostic testing capabilities that may then inspire the creation of new technologies and commercial spinoffs, including blood testing kits that can generate findings instantly using nothing more than a smartphone camera.

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The interdisciplinary centre is anticipated to house 100 full-time researchers and employees with backgrounds ranging throughout the spectrum of engineering and science, from optics, computer science, and artificial intelligence (AI) to biology, medical technology, and chemistry.

Postgraduate students from NTU will have exceptional chances for interdisciplinary education and training that spans the molecular sciences and information technology through the graduate programme of IDMxS. More than 30 PhD students will receive support from the Centre, four of whom have already begun their studies. As clinical diagnostics become more digital, IDMxS will also create continuing education programmes aimed at developing and modernising the healthcare workforce.

By fusing the fields of biology and information technology – which have each recently undergone revolutionary changes – IDMxS will create the new science of digital molecular analytics. The objective is to develop tools that can track environmental data, such as air and water quality, and health information, like viral infections or molecular signatures that signal the existence of a disease, in real-time. To develop innovative solutions for issues with health, sickness, and environmental monitoring, this process begins with the development of fundamental science.

The ability to simultaneously gather a variety of data types from a biological sample and use tools like AI and machine learning algorithms to analyse and interpret the enormous volume of data that would otherwise be impossible for humans to make sense of is at the core of IDMxS' digital molecular analytical strategies. The research centre intends to someday spin out solutions like widely used software using digital molecular analytics.

Moreover, making blood sample test kits is one potential use for digital molecular analytics that IDMxS is investigating. The goal of this research is to create a tool that can recognise the various chemicals responsible for illnesses, infections, and diseases.

This suggests that a physician might someday be able to take a blood sample, analyse it with a smartphone camera, and obtain an accurate, real-time reading next to the patient at the doctor's table. A similar idea might do away with the necessity for additional time-consuming laboratory tests.

The extensive surveillance of illnesses spread by insects like dengue and malaria is another project that is now under development. Researchers can one day create an imaging system that can swiftly detect and monitor dengue among the mosquito population by recognising and analysing the chemicals that make up the dengue virus. Such studies might also be used to track other airborne infections and infectious diseases, in addition to insect-borne diseases that affect urban health.

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