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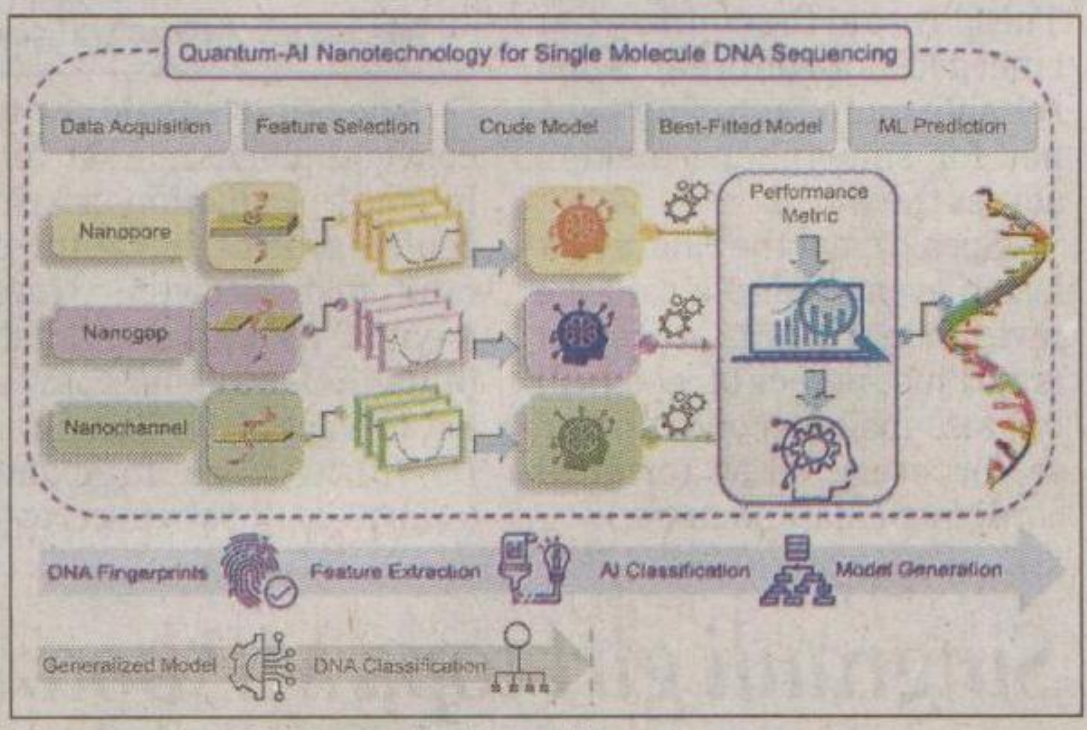
IIT-I develops tech to aid in early detection of genetic mutations

TIMES NEWS NETWORK

Indore: Indian Institute of Technology, Indore (IIT-I), has developed Quantum AI nanotechnology that will help in accurate and early detection of genetic mutations, including those associated with cancer.

The researchers used advanced AI algorithms to decode the raw electric signals with exceptional speed, accuracy, and cost-efficiency, overcoming the long-standing limitations of traditional sequencing methods.



How Quantum AI Nanotechnology will work

The new technology, aimed at revolutionising unified DNA sequencing by fusing quantum transport with explainable artificial intelligence (AI), is seen as providing rapid, high-resolution, and cost-effective natural, epigenetic, and artificial DNA sequencing, IIT-I said in a statement issued on Tuesday. The development is led by Professor Biswarup Pathak and his research team, including Dr Sneha Mittal and Dr Milan Kumar Jena from the chemistry dept.

Professor Pathak said, "This technology has transformative implications for genomics, personalised medicine, and cancer diagnostics, facilitating the early detection of genetic mutations and cancerous transformations. By enabling personalised treatment strategies and improving patient outcomes, this invention empowers researchers and clinicians with a powerful tool to decode genetic information across a broad spectrum of genomic contexts, marking a significant leap forward in DNA sequencing with unmatched precision and clarity."

Traditional sequencing methods, such as Sanger sequencing and short-read next-generation sequencing, often fail to detect complex genetic variations, including structural variants and modifications that are crucial for understanding genetic disorders and cancers, the institute said. IIT-I director Professor Suhas Joshi said, "These methods provide limited read lengths, which can miss important genomic information. The Quantum-AI nanotechnology with a solid-state nanopore/nanogap device has the potential to overcome this by providing high-resolution detection of nucleotides as they pass through the device, capturing unique electronic signatures that precisely identify genetic mutations."