

IIT-Indore, ISRO develop sensor for next gen missions to space

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Indore: Researchers at the Indian Institute of Technology, Indore (IIT-I), in collaboration with ISRO's Liquid Propulsion Systems Centre (LPSC), developed a cryogenic optical fibre sensor capable of functioning reliably at temperatures as low as -270°C. The next-generation sensing technology can significantly improve safety and performance in cryogenic systems used in launch vehicles, spacecraft fuel tanks and LNG infrastructure.

According to a statement issued by IIT Indore, the sensor overcomes a persistent limitation in cryogenic engi-



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neering, whereby the conventional resistive, thermocouple and standard optical fibre sensors lose accuracy or fail altogether in the ultra-cold environments required for handling liquid helium, hydrogen and nitrogen. The newly developed sensor uses Shape Memory Alloy (SMA) coatings on op-

tical fibres to achieve far higher sensitivity and stability than existing technologies.

The institute stated that the sensor's enhanced responsiveness allows precise detection of leaks, flow rates and liquid levels in cryogenic pipelines and tanks, which is crucial for safe rocket launches. It can also monitor the thermal health of launch-vehicle components and operate inside spacecraft fuel systems under vacuum and microgravity. Beyond space, the technology is suited for LNG pipelines and storage systems operating at around -180°C.

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Work on with LPSC to create durable sensor packaging

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This innovation reflects IIT Indore's commitment to strengthening India's strategic technological capabilities. Our collaboration with ISRO LPSC shows how advanced research from academia can support national space missions and contribute to indigenous aerospace technologies, said Prof Suhas Joshi, Director, IIT Indore.

Prof IA Palani, who led the research team, said the SMA-based optical fibre sensor demonstrated stable performance even at liquid-helium temperatures.

"Together with LPSC Bengaluru, we developed a highly sensitive cryogenic sensor that addresses one

of the biggest challenges in monitoring space-shuttle fuel tanks. The technology is now being refined for spacecraft applications," he said.

IIT Indore mentioned that work is underway with LPSC to create durable sensor packaging that can withstand the extreme conditions of space missions. TNN

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