Inspecting the Future: IIT Indore's AI Drones,

the New Guardians of Infrastructure Surveillance & Safety

Researchers at IIT Indore, led by Prof. Abhirup Datta along with Master's student Kumar Sheshank Shekhar and Ph.D. scholar Harsha Avinash Tanti, have made a significant breakthrough in the field of structural inspection and surveillance. They have developed a cutting-edge system that integrates Unmanned Aerial Vehicles (UAVs) with Artificial Intelligence (AI) and Machine Learning (ML) to inspect and detect anomalies in structures, especially in difficult-to-reach areas.

This innovative system uses AI-ML technology to identify and classify cracks and other anomalies in structures such as high-tension wires, buildings, and roads in real-time. Traditional inspection methods often struggle with accurately detecting these issues, particularly in complex environments. However, the AI-driven system developed by Prof. Datta and his team provides a more precise and reliable solution.

The UAVs are equipped with advanced cameras and LiDAR sensors, which together provide detailed information about the location and size of any detected anomalies. One of the key features of this system is its ability to process data directly on the drone using edge computing, allowing for real-time decision-making. The drone's payload has been optimized to minimize space and power consumption, ensuring high performance and efficiency.

The system has shown remarkable accuracy, achieving a 98.7% success rate in detecting and classifying cracks and processing data in just 25 milliseconds using advanced AI edge devices like NVIDIA Jetson. This innovation is expected to transform the way inspections are conducted, making the process faster, safer, and more reliable.

The work of Prof. Datta, Sheshank, and Tanti has gained significant attention from experts, recognizing its potential to advance inspection technology. As this system continues to be refined and applied, it is likely to have a significant impact on infrastructure monitoring and maintenance. This technology is particularly valuable for inspecting extensive road networks, cross-country gas pipelines, and hightension power transmission lines.

Moreover, the system's ability to categorize anomalies based on risk levels and report them in real-time to a ground station or inspection team is a unique advantage. This feature reduces the time and cost associated with maintenance and repairs. With its wide range of applications, including security and surveillance, this AI-enabled UAV system is set to become an essential tool in ensuring the safety and longevity of critical infrastructure.

The developed technology has massive applications in maintenance and surveillance of infrastructures like roads, power lines, etc., as well as in defense and space. Interested parties are encouraged to contact on the *eo-ctr@iiti.ac.in* for more information on technology transfer, commercialization and collaboration opportunities.

