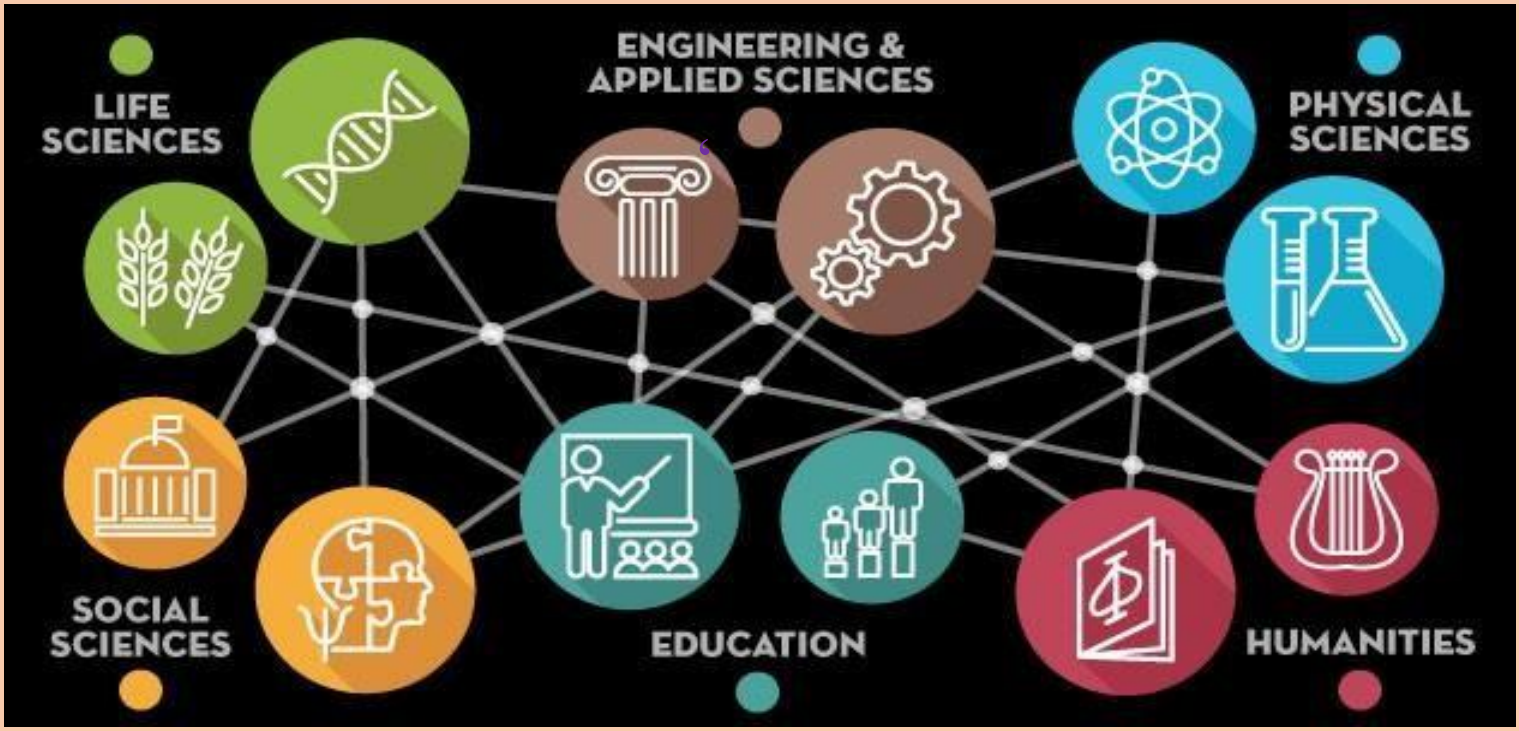
Indian Institute of Information Technology Design and Manufacturing Kurnool

Information Brochure

Ph.D. admissions
January 2027 Session

PhD Program under Drone Technology



About the Drone Technology

IIITDM Kurnool offers Ph.D. in Drone Technology for enthusiastic aspirants exploring the interface of various science and engineering disciplines. The Drone Technology PhD Program involves rigorous course work (12 or 24 credits depending on the academic background of students) followed by research work in an interdisciplinary research topic leading to a doctoral thesis.

Eligibility Criteria for Full-Time Ph.D.:

Applicants holding Master's degree:

- **Minimum Educational Qualifications:** Applicants must possess with a M.Tech/M.E/M.Sc., M.A.) (Research) degree in Engineering/Technology with from any recognized institute, with a minimum CGPA of 7.5/10 or 70% for UR/OBC/EWS categories and CGPA of 7.0/10 or 65% for the SC/ST/PwD categories.
- **Screening and Selection:** Entrance Test and/or Interview.

Direct admission to PhD with Graduation (B.E. / B. Tech. /B.S.):

Minimum Education Qualifications: Candidates who have qualified for the award of Bachelor's degree in Engineering/Technology with exceptionally good academic record in an eligible discipline will be considered for direct admission to Ph.D. Programme as a regular full-time scholar subject to fulfillment of one of the following conditions:

i. B.Tech ./ B.E / B.S degree (4 Years) holder of any CFTI/CFI with respective specialization with a minimum CGPA of 7.5 on 10.0 point scale for UR/OBC/EWS category and minimum CGPA of 7.0 CGPA on 10.0 point scale for candidates under SC/ST/PwD category. (**GATE Qualification is not Mandatory**)

ii. Bachelors in Engineering/Technology from any **non-CFTI** with valid GATE score and at least CGPA of 7.0/10 under UR/OBC/EWS category and at least CGPA of 6.5/10 for candidates under SC/ST/PwD category.

- Screening and Selection: Entrance Test and/or Interview. (*based on the number of applications received)
- In cases where the candidates are directly admitted to the PhD programme in Engineering /Sciences with a Bachelor's Degree in Engineering/Technology, the scholar should successfully complete prescribed courses (Coursework) with a minimum of 24 Credits.

Screening and Selection:

a) The Academic Section will conduct the shortlisting and selection process.

b) Eligible candidates possessing the minimum educational qualifications and satisfying additional criteria set by the institute from time to time only will be called for the written test and/or Interview.

c) The syllabus for the written test and/ or Interview is **GATE 2026 syllabus in respective subject (Station Department).**

d) The exam will be conducted either in CBT (Moodle) mode or offline based on number of applications.

e) Based on the academic record and the performance of the candidates in the written test and/or Interview test, the selection committee will finalize the applicants for admission to the Ph.D. programme.

Convener/coordinator of Ph.D. admissions and contact details:

- FIC (PG &R), Ph: 08518-289100 (Ext: 111)

Bank Account Details and Payment QR Code:

Account Name: **IIIT DESIGN AND MANUFACTURING**
Account Number: **37806955974**
IFSC Code: **SBIN0064655**
Branch: **IIITDM KURNOOL CAMPUS.**



Kindly fill out the Google Form using the link provided:

https://forms.gle/FYTbnRASfGpNWUkF6

Important Dates:

Web notification of the PhD Advertisement	06-10-2026
Online application registration process start date	06-10-2026
Last date for the submission of online Application form	18-10-2026
Notification of shortlisted candidates for Interview/Written Test	28-10-2026
Publication of Final Results	29-11-2026
Last date for seat acceptance and fee payment:	05-12-2026
Reporting to the Institute	14-12-2026

Tentative Schedule for Interview/Written Test:

Name of the Program	Examination Date and Reporting Time	Venue
Drone Technology	12-13th November 2026, 8:00 AM	Administrative Building 3rd floor

Note: Accommodation will be provided subject to availability.

Institute Website link: https://iiitk.ac.in

PhD Program under Drone Technology

S.No.	Title	Problem Statement
1.	Efficient Hardware Accelerator Designs on Drone Control Using Deep Learning	The real time drones on the air defense system need to promptly respond according to the position of the attacking missiles/drones. Now, the immediate response of the defending drone is required for the protection of the respective airspace. Our objective is to use the deep learning models in the defending drones to track the attacking missiles/drones and produce the required response promptly using the FPGA based co-processor. Due to the parallel execution of the hardware blocks in FPGA based co-processor, we can confidently expect the high performance or less latency with the co-processor implementation as compared with the conventional microcontroller implementation. Hence, our objective is to train the defending drones with the deep learning models to protect the airspace from the attacking missiles/drones by utilising the FPGA based co-processors to produce the required response promptly.
2.	Multisensor-Enabled UAV Swarm for Autonomous 3D Printing	UAV-assisted 3D printing is gaining attention for rapid and automated construction. This project proposes a multisensor-enabled UAV swarm in which multiple UAVs collaboratively divide and execute construction tasks. Sensors on each UAV continuously monitor the sub-structure being printed and share real-time information with other UAVs for coordinated construction. The multisensor data will also enable early detection of defects and construction errors, reducing material wastage, rework, construction time, and overall cost while improving construction quality.
3.	RGB-LiDAR based edgeAI integration for onboard glacial monitoring using LiDAR drones	LiDAR drones are becoming increasingly popular these days for acquisition of multimodal data of RGB images as well as 3D point clouds. These associated RGB images can give colour to the drone images but a deep-learning based integration is required for sophisticated tasks like volume analysis, carbon-mass assessment, tree-density estimation, landslide monitoring or protecting against glacial errosion. On top of it, an on-device recognition can be facilitated if an on-board processing unit can be mounted to such drones for edge-AI. The problem statement investigates on a joint-learning task RGB-X features from RGB and LiDAR camera for effective 3D-based land-cover estimation. Further, an optimistic objective is to build a low-resource edgeAI model to be processed within a drone integrated with a high-computation graphics card. The target area would be on-device glacial monitoring through LiDAR drones on remote Himalayan belt guarding against the natural calamities like the most recent one in Nepal.
4.	Satellite Communication for Drones	Satellite Communication for Drones
5.	FPGA-Based Neuro-Fuzzy Control for UAV Trajectory Tracking	UAV trajectory tracking is challenging due to nonlinear dynamics, external disturbances, and rapidly varying flight conditions. Conventional controllers may provide limited adaptability under such uncertainties. Therefore, an FPGA-based neuro-fuzzy controller is proposed to enable real-time adaptive UAV trajectory tracking with low computational latency. The objective is to improve tracking accuracy, stability, and disturbance rejection while achieving efficient FPGA resource utilization and low power consumption.

6.	Drone-assisted Vehicular Communication for Reliable, Low-latency, and Secure Communication for Internet of Vehicles	Drone-assisted Vehicular Communication for Reliable, Low-latency, and Secure Communication for Vehicles/Internet of Vehicles operating in challenging environments such as hilly roads, accident-prone zones, and areas with limited communication infrastructure... The vehicular communication system allows vehicles to transmit critical safety messages among themselves and the roadside infrastructure, although its performance is highly affected in difficult environments due to the intermittency of connectivity, less roadside infrastructure, non-line-of-sight, and frequent changes in the network topology. The use of drones provides an aerial communication and sensing platform that can be deployed effectively and quickly in regions where the normal Roadside Unit (RSU) and cell phone infrastructure is unavailable or unreliable. Drones with the ability to take pictures, sense the environment, and communication capability can monitor road condition and identify the occurrence of any hazards like accidents, landslides, obstructions, and congestion and then transmit this information to vehicles via the Vehicle-to-Drone-to-Vehicle (V2D2V) communication system.
7.	AERO-Path: Joint Optimization of Task Offloading, Cooperative Edge Caching, and Adaptive Single- and Multi-UAV Path Planning for Flood Disaster Management	Effective flood monitoring depends on observing affected areas, processing collected data quickly, and making current information available when needed. UAVs can support these activities by collecting data and sharing processing tasks with nearby UAVs, edge servers, and the cloud. Their operation, however, is limited by battery capacity, onboard computing resources, and unreliable communication links. Flood conditions also change over time, requiring UAVs to adjust where they fly, how long they hover, and which tasks they prioritize. These decisions are connected. A UAVâ€™s position affects its coverage and access to computing resources, while the choice of where to process a task influences delay, energy use, and workload. Information stored on UAVs and edge nodes may become outdated as the flood develops or difficult to access as UAVs move. Handling task offloading, flight planning, and caching separately can therefore lead to delayed results, wasted energy, uneven workloads, and decisions based on stale information. The main problem is how to coordinate these activities so that critical regions receive timely attention within the available resources. This research aims to develop an aerial edge computing framework that integrates these decisions. It will assign monitoring tasks to suitable processing locations based on task priority, data size, available computing capacity, communication conditions, and UAV energy. Deep reinforcement learning will guide the trajectories, task allocation, and hovering behavior of single and multiple UAVs, while accounting for connectivity, collision avoidance, and changing flood conditions. A cooperative caching mechanism will manage where flood-related information is stored and when it is updated, taking into account UAV mobility and information freshness. The framework will be evaluated using task latency, energy consumption, task completion rate, cache hit ratio, information freshness, coverage, communication reliability, and workload balance across UAVs.
8.	Intelligent Multi-Sensor Data Fusion for AI-Based Autonomous Underwater Navigation	Autonomous underwater navigation is challenging because underwater environments provide limited and unreliable sensing, particularly in low-visibility conditions and GPS-denied environments. Different sensors such as cameras, sonar, IMU, and depth sensors provide complementary but noisy information. Developing a practical method to combine these sensor data and make reliable navigation decisions is therefore an important Computer Science problem. The proposed research aims to develop an AI-based multi-sensor data fusion framework that combines data from selected underwater sensors to improve environment perception, localization, obstacle detection, and navigation decisions. The system will be developed and evaluated initially using public datasets and simulation, followed by experiments on an available underwater drone platform

9.	FPGA based LLM intergrated intelligent Drone Flight controller	This research proposes a novel, high-efficiency System-on-Chip (SoC) FPGA architecture for an intelligent drone flight controller. Traditional microcontrollers struggle to balance real-time, microsecond-level motor control with high-compute edge AI processing (such as SLAM and obstacle avoidance). This project aims to bridge this gap by designing a hybrid hardware/software framework on an AMD Xilinx Zynq UltraScale+ MPSoC. By utilizing High-Level Synthesis (HLS) and custom Deep Learning Processor Units (DPUs), this project will achieve deterministic, fault-tolerant flight stabilization paired with sub-millisecond edge AI decision-making.
10.	Robust Small Object Detection and Subtle Defect Recognition in Drone Imagery Using Advanced Image Processing and Deep Learning	Drone-based image analysis plays a vital role in agriculture, infrastructure inspection, and surveillance. However, detecting small objects, subtle defects, and partially occluded regions in drone images remains challenging due to variations in scale, illumination, background complexity, and viewing angles. This research aims to develop a robust and computationally efficient image processing framework for accurate detection and recognition of small objects and subtle defects in drone imagery. The proposed work will investigate multi-scale feature extraction, image enhancement, attention-based deep learning, and occlusion-aware detection techniques to improve detection accuracy and generalization under challenging imaging conditions. The framework will be optimized for real-time deployment on resource-constrained drone platforms, enabling reliable autonomous monitoring and intelligent aerial inspection.
11.	Control Engineering on Drones	Identifying the optimum control for a specified maneuver of drones
12.	Digital-Twin-Driven Predictive and Collaborative Autonomy for Persistent UAV Mission Management	Current UAV systems are increasingly capable of autonomous navigation and sensing, but most missions remain largely pre-planned and lack the ability to continuously predict whether a UAV can safely and efficiently complete its assigned mission under changing energy, health, environmental and communication conditions. The problem becomes more challenging in multi-UAV operations, where UAVs may have different sensing capabilities, energy levels, computational resources and operational health. This research proposes a Digital-Twin-Driven Cognitive UAV framework in which a continuously synchronized digital twin maintains the physical and operational state of each UAV and uses AI-based predictive models to estimate energy availability, vehicle health, mission completion probability and operational risk. Based on these predictions, the UAV will autonomously decide whether to continue, replan, return for charging/docking, or transfer the task to another UAV. The research will subsequently extend to heterogeneous multi-UAV collaboration, where mission tasks are dynamically allocated or transferred based on UAV capability, energy, health, communication quality and mission priority. The framework will be validated through a physical UAVâ€“digital twin testbed and real-world mission scenarios such as infrastructure inspection and monitoring. The research aims to develop novel algorithms for predictive UAV autonomy, resource- and risk-aware mission planning, autonomous mission recovery and collaborative multi-UAV task allocation.

13.	Photonics-Enabled Intelligent Drone Technology for Autonomous Sensing and Navigation	The proposed PhD work focuses on the development of photonics-enabled drone technology for intelligent sensing and autonomous navigation. The research will integrate FBG sensors, fiber-optic gyroscopes (FOG), optical sensors, and AI-based signal processing with UAV platforms for real-time monitoring and navigation in challenging and GNSS-denied environments. The developed system will be investigated for applications such as infrastructure monitoring, precision agriculture, mining, and disaster management, with emphasis on compact, accurate, low-power, and reliable photonic sensing solutions.
14.	VLC-Based High-Precision 3D Positioning and Navigation of Autonomous Drones	Conventional drone navigation systems based on GPS, Wi-Fi, Bluetooth and UWB face limitations in indoor environments, RF-congested areas and locations affected by electromagnetic interference. This project proposes the development of a Visible Light Communication (VLC)-based positioning and navigation system for autonomous drones, using LED transmitters and photodetectors to estimate the drone's position through parameters such as Received Signal Strength (RSS), Angle of Arrival (AoA) and light intensity. Signal-processing and localization algorithms will be developed to achieve accurate real-time 3D position estimation, including altitude estimation, and to support autonomous drone navigation. The system will be investigated for applications in warehouses, smart buildings, disaster-response environments and other GPS-denied areas. Key challenges including line-of-sight requirements, ambient-light interference, multipath effects, limited coverage and drone movement will be addressed through suitable signal-processing and adaptive localization techniques.
15.	Deep Learning-Enabled UAV Phenotyping: Predicting Biomass and Nitrogen Across Crops, Seasons, and Growth Stages	UAV-based phenotyping enables rapid estimation of breeding-relevant crop traits. Most current methods depend on vegetation indices, limiting scalability and robustness.This PhD will develop deep learning models to predict biomass and nitrogen directly from UAV RGB and multispectral imagery. Multi-temporal imagery will be integrated with ground-reference traits such as plant height, canopy cover, and leaf area.Models will be benchmarked against conventional approaches and tested for robustness across crops, seasons, and growth stages.The goal is a scalable image-to-trait framework that accelerates crop improvement by reducing labor-intensive field measurements. This work is in collaboration with ICRISAT, Hyderabad