INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
POWAI, MUMBAI 400076.

Advertisement No.: IRCC/EXT015/2025

Job Title
Senior Project Research Scientist

Job Reference Number
50669920

Application End Date
07.02.2025

Type of Employment
Proj. Staff Contract

No. of Position(s)
1

IITB Project Recruitment:

Project title: Human-Like Intelligent System using Drones

About the project: The Maharashtra Drone Mission is an ambitious initiative launched by the Government of Maharashtra to position the state as a global leader in drone technology. This mission aims to foster indigenous research, development, and commercialization of drone and allied technologies, leveraging the expertise of academic institutions, R&D institutes, industries, government, and the youth. The initiative will focus on establishing drone centres, developing a safe and reliable autonomous drone ecosystem, and advancing counter-drone technology. Additionally, it will support start-up incubation, training, outreach programs, and the development of a supportive regulatory framework. The mission seeks to create jobs, drive economic growth, and generate revenue, ensuring long-term self-sustainability.

By integrating advanced artificial intelligence (AI) and video analytics, the Maharashtra Drone Mission plans to enhance the capabilities of unmanned aerial vehicles (UAVs), making them more effective and versatile. These innovations include intelligent surveillance, real-time object identification, swarm UAV technology, and advanced autonomous features such as self-charging and coordinated payload lifting. This project represents a significant step towards a technologically advanced and self-reliant Maharashtra, with widespread applications in both urban and rural settings.

Essential Qualifications & Experience:
PhD with minimum 4 years relevant experience
OR
MTech/ME/MDes/MBA or equivalent degree with minimum 8 years relevant experience
OR
BTech/BE/MA/MSc/MCA or equivalent degree with minimum 10 years relevant experience

The candidate should have expertise in designing, developing, and optimizing advanced technologies to seamlessly integrate AI and machine learning into autonomous drone systems.

Candidates only with specified experience are encouraged to apply.

Job Profile:

This role is pivotal in managing teams and fostering collaboration with industry and government stakeholders. The ability to blend technical expertise with creativity, leadership, and problem-solving skills will be key to driving the project's success.

Key Responsibilities
- AI-Driven Development: Research, design, and develop high-performance algorithms in humanlike intelligence, computer vision, sensor fusion, and autonomous drone decision-making.

- Team Leadership: Build, guide, and mentor research teams, fostering a collaborative and innovative work environment that encourages creative problem-solving and productivity.

- Testing and Deployment: Oversee drone prototyping and extensive field testing to ensure robust performance in dynamic defence and anti-terrorism use cases.
Collaboration and Stakeholder Engagement: Work closely with multidisciplinary teams, including researchers, engineers, defence stakeholders, and government agencies, to ensure deliverables align with project goals.

- Knowledge Sharing: Publish research in top-tier journals, present at international conferences, and mentor junior researchers to ensure knowledge dissemination and project visibility.

- Strategic Problem Solving: Tackle complex challenges by leveraging a methodical approach and deploying emerging technologies with agility and focus.
AI/ML Model Development and Deployment: Assist in creating real-time object detection and segmentation models using PyTorch from scratch for drone applications.

- Data Programming: Data labelling using data programming and tools like SPEAR.

- LiDAR Data Analysis: Process LiDAR point clouds for navigation, obstacle detection, and sensor fusion in 3D environments. Knowledge about various 3D data file types, 3D data object detection and segmentation algorithms and fine tuning as well as building these algorithms from scratch.

- Drone Communication Protocols: Implement and optimize MAVLinks and study various protocols for robust drone-to-drone and drone-to-ground communication.

- Self-Supervised Learning: Implement cutting-edge self-supervised learning frameworks for drones to autonomously adapt and learn from their environments without explicit human-labeled data.

- ROS Systems and Integration: Develop and debug ROS-based pipelines for navigation and AI module integration.

- Object Detection and Segmentation Models: Work with architectures like YOLO, Faster R-CNN, and Mask R-CNN, SAM2 finetuning and optimizing for drone-specific constraints.

- System Prototyping and Testing: Test and troubleshoot drone prototypes integrating AI models and hardware systems.
Dockerization : Dockerize various ML models and deploy them for edge computing on drones.

- Collaboration and Innovation: Collaborate with multidisciplinary teams to innovate AI-driven drone solutions using the latest technologies.

- Transformer-Based Models: Design, implement, and optimize transformer architectures like Vision Transformers (ViTs) and DETR for object detection, semantic segmentation, and aerial imagery analysis, adapting them for drone-specific computational constraints.

- Federated Learning: Design federated learning systems to allow distributed AI training across drone fleets without compromising data privacy or performance.

Pay Details:

Level PR-O3 : Salary range from Rs.58800 to Rs. 109200 + Rs.10000.00/- Out Of Campus Allowance (if applicable) p.m.

General information:

The position is temporary for a period of 1 year and tenable only for the duration of the project. The appointment is for time bound project and the candidate is required to work mainly for the successful completion of the project. The selection committee may offer lower or higher designation and lower or higher salary depending upon the experience and performance of the candidate in the interview.

Candidates called for interview will be required to attend at his/ her own expenses.

For any queries/clarification please contact: recruit@ircc.iitb.ac.in