IIT Tirupati Navavishkar I-Hub Foundation

Indian Institute of Technology Tirupati

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मारतीय प्रौद्योगिकी संस्थान तिरुपति

T I R U P A T I

Call for Proposals

About IIT Tirupati Navavishkar i-Hub Foundation (IITTNiF)

IIT Tirupati Navavishkar i-Hub Foundation (IITTNiF), a pioneering initiative under the Department of Science and Technology's NM-ICPS, is dedicated to spearheading innovation and research in the field of Positioning and Precision Technologies (PPT). As a hub of excellence, IITTNiF focuses on developing advanced capabilities in critical areas such as remote sensing, GIS, GPS technologies, and other non-invasive techniques. Our mission is to foster a collaborative ecosystem that drives technological advancements, making significant contributions to India's strategic initiatives like Make in India and Atmanirbhar Bharat. Through our efforts, we aim to position India as a global leader in PPT, supporting sustainable development and the digital economy. For more information, visit https://iittnif.com

Call Overview

IITTNiF invites academicians, researchers, and industry experts to submit proposals that advance Technological and Product Development in PPT. This field focuses on achieving accurate and reliable positioning, navigation, and tracking capabilities across various applications and industries. We seek proposals that lead to the design and prototyping of systems, products, or services with significant industry relevance to PPT.

Submission Deadline

Last Date: 15th May 2024

Challenges and Expectations

For the Call for Proposals in Positioning and Precision Technologies (PPT), we are focusing on three broad technological domains:

- Capturing Technologies: This encompasses advancements in high-accuracy positioning systems, innovative remote sensing methodologies, and sophisticated underwater and aerial mapping technologies.
- Processing or Analysis Technologies: This area includes the development of algorithms and systems for advanced data processing. Key focuses are AI-driven geospatial data analysis and the integration of IoT-based sensing networks for real-time analytics.
- UX/UI Solutions: Aimed at enhancing user engagement, this domain seeks innovative user-centric interfaces and immersive technologies to simplify and enrich the interaction with geospatial and remote sensing data across various applications

S.No	Challenge Title	Domain of Interest	Challenge Overview	Innovation Objectives	Project Deliverables	Long-term Impact
	Capturing Technologies					
1	High-accuracy Positioning in Deep-sea Environments	Underwater Navigation and Mapping	Develop a system for centimetre-level accuracy in deep-sea navigation without surface support.	Integrate advanced navigation technologies and algorithms.	A validated prototype demonstrating high-accuracy underwater navigation.	Enable extensive deep-sea exploration with potential for autonomous operations.
2	Advanced Sonar and Lidar Integration for Underwater 3D Mapping	Underwater Navigation and Mapping	Create an integrated sonar and Lidar system for high-resolution 3D mapping underwater.	Fusion of sonar and Lidar technologies with AI for enhanced data processing.	A high-resolution 3D mapping system prototype.	Advanced applications in marine archaeology and environmental monitoring.
3	High-Resolution Earth Observation Technologies	Remote Sensing	Advance in remote sensing to capture high-resolution, multi-spectral data for Earth observation.	Advancement in sensor technologies and miniaturization.	Technologies capable of detailed Earth observation data capture.	Support for agriculture, urban planning, and climate monitoring.
4	Advanced UAV-based LiDAR for Topographic Mapping	UAV Technology	Enhance UAV-based LiDAR systems for precise topographic mapping with AI feature detection.	Improve UAV LiDAR systems for automated mapping and real-time data processing.	An advanced UAV LiDAR system for topographic mapping.	Applications in surveying, urban planning, and environmental studies.

5	Quantum-based PNT systems	Quantum Technology	Improve the precision and security through Quantum Technology	Develop advanced sensors and atomic clocks through Quantum technology	Advanced Sensors for secure communications or atomic clocks for precise PNT.	Guided Missiles and Secure communications against data tampering
	Processing or Analysis Technologies					
6	Autonomous Underwater Habitat Mapping	Underwater Navigation and Mapping	Engineer systems for comprehensive mapping of underwater habitats with feature detection.	Develop autonomous vehicles with advanced sensing and AI for real-time mapping.	A platform capable of generating detailed 3D maps of underwater habitats.	Tools for marine conservation and underwater ecosystem studies.
7	Autonomous Underwater Vehicle (AUV) Navigation in GPS-denied Environments	Autonomous Systems	Innovate navigation for AUVs in environments lacking GPS, using acoustic and inertial systems.	Develop algorithms and sensor fusion techniques.	AUVs capable of precise navigation and task performance in GPS-denied zones.	Enhanced underwater exploration and data collection capabilities.
8	AI and Machine Learning for Geospatial Data Analysis	Data Analysis	Tailor AI and machine learning algorithms for geospatial data analysis.	Develop algorithms for pattern recognition, predictive modelling, and insight extraction.	AI algorithms capable of processing and analysing geospatial data.	Enhanced decision-making in disaster management, urban planning, and environmental monitoring.
9	Real-time Data Processing and Analytics for	IoT and Analytics	Develop scalable, secure solutions for real-time	Create systems for scalable and secure real-time data	Systems for real-time IoT data analysis.	Application in smart cities, precision agriculture, and

	IoT-based Sensing Networks		data analysis from IoT-based sensing networks.	processing and analytics.		infrastructure monitoring.
10	AI powered PNT anomaly detection and Correction	Position, Navigation and Tracking	Identification of different types of errors in PNT data acquired through different sources	Develop an Intelligent Error identification and Correction algorithms with the help of Artificial Intelligence	Application specific error resilient AI algorithms	Navigation, timing synchronization, and asset tracking
	UX/UI Solutions					
11	Multi-sensor Fusion for Indoor Positioning Systems	Indoor Navigation	Develop a robust indoor positioning system using data from multiple sensors and machine learning.	Integrate various sensor data with AI for improved accuracy and resilience.	A scalable and accurate indoor positioning system.	Application in complex environments like airports and malls for improved navigation aids.
12	AR-based Navigation and Information Systems	Augmented Reality	Utilize AR to improve indoor navigation and information delivery, providing intuitive guidance.	Develop AR applications for context-aware navigation and information delivery.	An AR navigation and information system enhancing user experience.	Use in public venues to improve wayfinding and contextual information delivery.
13	User-Centric Design for Geospatial Data	UX/UI Design	Design UX/UI solutions for intuitive interaction with	Develop intuitive, accessible interfaces for complex data interaction.	User-friendly geospatial data visualization platforms.	Making complex data analysis accessible to a broader audience,

	Visualization Platforms		geospatial data by non-experts.			including policymakers and educators.
14	Immersive Interfaces for Remote Sensing Data Interaction	Immersive Technology	Innovate with VR/AR for engaging interaction with remote sensing data.	Utilize immersive technologies for enhanced user interaction with geospatial information.	Immersive interfaces for remote sensing data interaction.	Enhanced engagement and understanding of geospatial information for various applications.

Critical Selection parameters

Our critical evaluation criteria for proposal selection are highlighted below:

- Targeting Technology Readiness Level (TRL) ≥ 4: Proposals should set a clear goal to elevate the proposed technology to at least TRL 4, demonstrating validation in a controlled setting and readiness for further practical development.
- Translational Potential: Proposals must outline a strong potential for translation into practical applications, yielding tangible results such as new products, platforms, or patents.
- Industry Collaboration Encouraged: It is highly recommended to seek industry collaboration, which significantly enhances the proposal's applicability, market potential, and pathway to commercialization.
- Diverse Expertise: A team with a broad range of skills and expertise is crucial for fostering innovation and addressing multifaceted challenges effectively.

Time Frame

Hub is currently seeking proposals for a duration of 18 months, with exceptional proposals being provided for up to a two-year time frame.

Guidelines to Submit the Proposal

1. The proposal submission can be done by the Principal Investigator (PI) (Must be an academician) either individually or in collaboration with either;

Academia: University / Research Institute with a well-established support system for research.

The institute should have been established in India and have NAAC / UGC / AICTE or any equivalent recognition certificate or any other Public / Government organization/Institute of National Importance.

(or)

Industry: Company (Startup, Small, Medium, or Large) / LLP incorporated under the Indian Companies Act, 1956/2013 or the Limited Liability Partnership Act, 2008.

2. Applications can be submitted for more than one project by filling in a separate application form but the TIH may fund only for one project at time from a PI.

3. The Principal Investigator must submit the Endorsement letter from their parent organization.

4. The Principal Investigator with Co-Principal Investigator (s) from either academia or industry must submit the endorsement letters from all the participating entities.

5. The Principal Investigator shall be responsible for the technical and managerial aspects of the project execution. Co-Principal Investigator (Co-PI) becomes crucial in ensuring project continuity and management in the absence of the PI. In the case of leaving the institute, the PI/Co-PI must give a prior Intimation to IITTNiF.

6. The application must be submitted only through the Google form.
*Apply here: https://forms.gle/hozd3WUobxWviwiP7

Terms and Conditions from IITTNiF

Equipment Acquisition:

- Assets procured with allocated funds will be the property of IITTNiF, with restrictions against selling, pledging, or utilizing them for non-approved purposes.
- The Principal Investigator (PI) is liable for the cost of repairing or replacing damaged equipment.
- IITTNiF reserves the right to reassign assets to partner entities or other organizations as deemed suitable.
- Approval from IITTNiF is mandatory for significant capital expenditures.

Funding Milestones:

- Fund disbursement will be contingent upon the achievement of predefined stages and project milestones.
- Project-employed personnel are required to devote their full efforts to the project, with their salaries disbursed monthly by IITTNiF.
- Technical assessments will be conducted at each project stage, and operational evaluations will occur monthly.

Project Review:

- IITTNiF may appoint specialists or an expert panel to periodically review the project's progress and offer guidance towards meeting the objectives.
- Hosting institutions are tasked with providing necessary accommodations and facilities for visiting review personnel.
- Regular technical stage-wise and monthly operational evaluations will be conducted to ensure progress and adherence to goals.

Publications, Intellectual Property, and Prototype Development:

- Investigators are encouraged to disseminate their research findings through reputable journals, ensuring that patent filings and publications are coordinated through IITTNiF in line with its IP policy.
- Unauthorized filing of patents or intellectual properties related to the project work by the PI or their host organization is prohibited.
- Prototypes advancing beyond Technology Readiness Level 4 must be disclosed to IITTNiF for consideration of patent filing or protection.

General Guidelines:

- A separate audited account must be maintained for the project's finances, with all funds stored in an interest-bearing account. Generated interest may contribute to offsetting future fund allocations.
- Projects found misusing funds or failing to make satisfactory progress are subject to termination by IITTNiF.
- In the event of the PI's departure from the host institution, a three-month notice is required along with a comprehensive plan for project completion, developed in consultation with IITTNiF.
- Systematic collection, documentation, and submission of project data to IITTNiF are essential for public dissemination, except in cases requiring legal protection.
- Full documentation and instructions for products, prototypes, programs, and applications developed during the project must be submitted to IITTNiF.
- The PI is obliged to disclose any previous or ongoing professional or disciplinary actions, including cases of plagiarism or image manipulation.