NMICPS TiHAN FOUNDATION IIT HYDERABAD

| NextGen Autonomous Navigation

Department of Science & Technology (DST), Government of India
National Mission on Interdisciplinary Cyber-Physical Systems (NMICPS)

Technology Innovation Hub on Autonomous Navigation and
Data Acquisition Systems (TiHAN) Foundation

tihan.iith.ac.in

TiHAN-IITH
Vision

Hub for Safe, Sustainable, Smart Next Generation Mobility

Real-time Autonomous Navigation and Data Acquisition Systems (Unmanned - UAVs, ROVs, etc.)

Quality Data Acquisition for Aerial/Terrestrial Mobile Environments Multi-sensory Perception Scenario (UAVs, ROVs.), AI Framework, Real-time Edge Compute Architecture, Communication Networking,Testing Validation, Simulators (Virtual/Physical), Design

Standard Operating Procedures (Autonomous UAVs, ROVs, etc.)

Testbed/Living Labs for Autonomous Navigation Systems (Aerial and Terrestrial Vehicles)

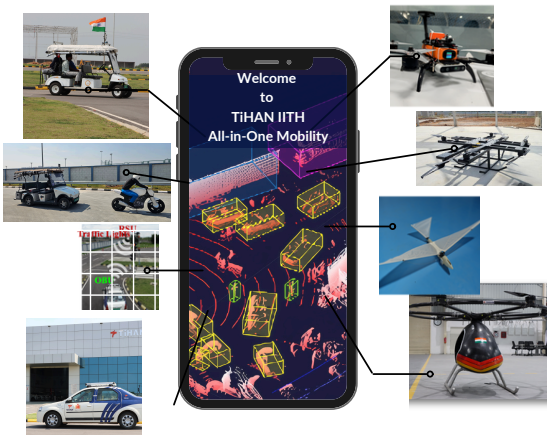
Autonomous Transportation Systems (Aerial/ Terrestrial/Surface)

Agriculture & Farming Infrastructure & Environment & Defence & Surveillance

Re-imagine ways of working with industry and academic partners to accelerate change

TiHAN-IITH
Activities

TiHAN - IITH: Source for fundamental knowledge and technologies (IPs, Publications, Products, Commercialisation as Licencing, ToTs.....) in the technology vertical of Autonomous Navigation and Data Acquisition Systems.



TiHAN Core Research/Work Groups

Communication & Networking

Real-time Edge Computing

Security

Safety, Testing & Validation

System Control

Artificial Intelligence / Machine Learning

Design

Simulators (Virtual, Physical, Dummies)

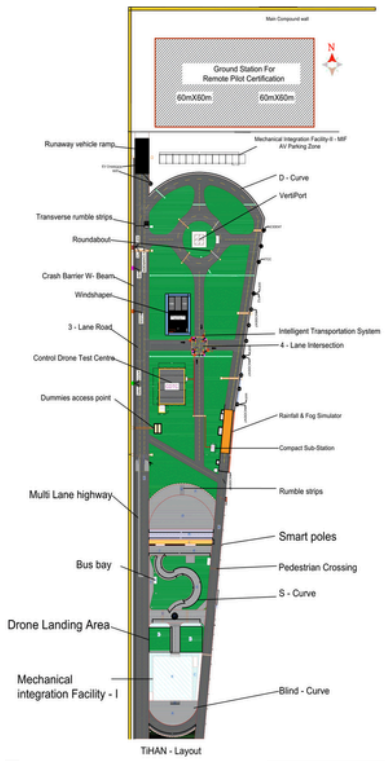
Entrepreneurship, Management & Business Studies

Autonomous Navigation
Testbed (Aerial/Terrestrial)

A first of it's kind state-of-the-art testbed for Autonomous Navigation (Aerial/Terrestrial)

Technology development and thorough validation before going for real field deployment

Facilities include – Proving Grounds, Test tracks & circuit, Mechanical integration facilities like Hangers, Ground control stations, State of the art Simulation tools (SIL, MIL, HIL, VIL), Road Infra –Smart Poles, signalized & unsignalized Intersections, Environment Emulators like Rainfall Simulators , V2X Communications, Drone Runways & Landing area, Control Test centres, Edge cloud, Multi Radio Access Technologies such as WiFi, BVLOS, CV2X, 5G, DSRC.



TiAND
Dataset

TiHAN has launched the TiHAN-IITH Autonomous Navigation Dataset (TIAND) Dataset for Download. (https://tihan.iith.ac.in/tiand-datasets/)

- Data Collection Vehicles: Aerial, Terrestrial and Underwater.
- Datasets offered: Agriculture; Indian roads; Underwater.

The dataset from Hyderabad, India, integrates structured and unstructured traffic data from four cameras, six radars, a Lidar, and GPS/IMU technologies, providing a comprehensive multimodal perspective for enhancing object detection algorithms.

Technology
Development

TiHAN at IITH focuses on Unmanned Aerial Vehicles (UAVs) and Unmanned Ground Vehicles (UGVs) for a wide range of applications.

UAVs

In Nano/Micro category drones, Bio-Inspired drones like Quad-wing UAV (Dragonfly based) and Flapping Wing Micro Aerial Vehicles (Aerial Birds based). In Medium/Large category drones, TiHAN is focusing on developing solutions for next generation urban air mobility – air taxis, air metros, air ambulances etc. Harnessing the 5G and edge cloud technologies, these UAVs enable precision landing, swarm coordination, and real-time decision-making, pushing the boundaries of aerial innovation.

UGVs

TiHAN focuses on advancing autonomous technologies using UGVs equipped with LiDAR, cameras, and RADAR sensors for Drive-By-Wire enabled path planning and control. AD features are built into passenger vehicle, campus shuttles, and bicycles (for last - mile connectivity). AD/ADAS features includes GPS based Navigation, Map based Navigation, VRU (pedestrian, bicyclist), Motorcyclist & Car detection, emergency braking, LDWS, LKA. Used test scenario of ADAS function assessments in SIL framework for an Indian setting. Connected Vehicles in the CV2X and 5G Network for various V2V,V2I and V2X algorithms for obstacle avoidance and path planning are being developed .

Testing
ISO Compliant

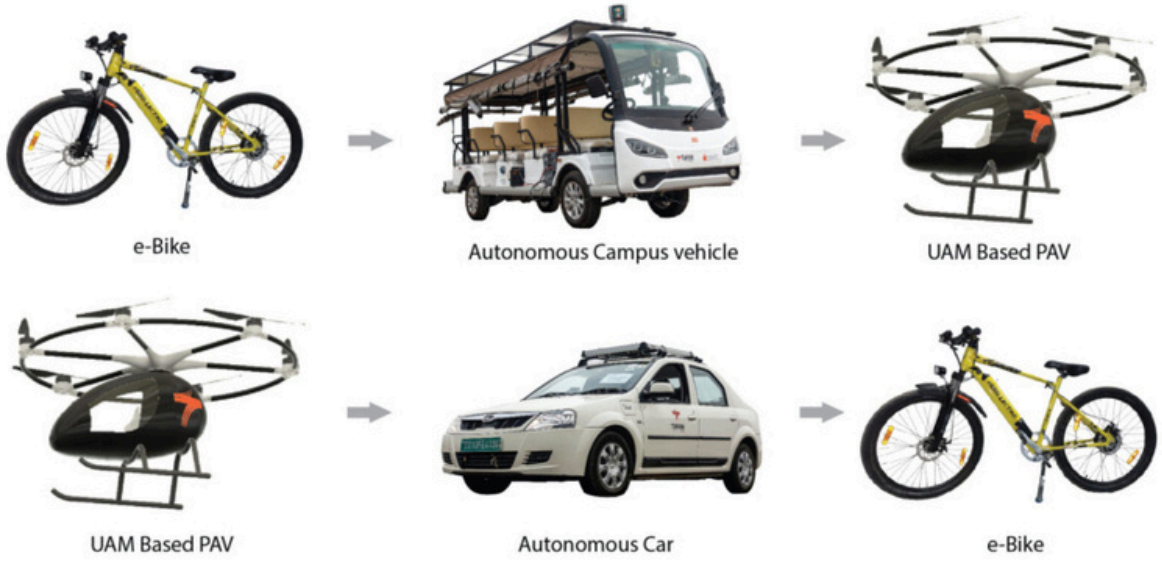
TiHAN advances safe, smart, and sustainable mobility by integrating UNECE standards and Euro NCAP scenarios to test ADAS features like AEBS, FCW, and ACC. With Vehicle-in-Loop testing, we ensure safety and reliability, aiming to address India-specific driving challenges and enhance innovation in mobility solutions while prioritizing vulnerable road user protection.

EuroNCAP Certified Soft Targets for Active Safety

Going Forward

End to End Connectivity : Multi-modal Transportation Solutions for Indian Scenarios

Energy efficient autonomous navigation enabled different modes of Electric Vehicles: Last mile connectivity, Shared Shuttle services, Urban Air Mobility – personalized air vehicles



About
TiHAN Foundation

- NMICPS Technology Innovation Hub on Autonomous Navigation Foundation is registered to avail CSR funds & we solicit grants from eligible companies inline to their continued patronage for CSR activities
- Contributions to TiHAN Foundation are exempt from income tax under section 80G of Income Tax Act of 1961, (India)
- TiHAN is recognized as a Scientific and Industrial Research Organisation (SIRO) by the Department of Scientific and Industrial Research (DSIR) under the Ministry of Science and Technology, Government of India.
- TiHAN is registered under Foreign Contribution (Regulation) Act 2010 by Ministry of Home Affairs, (FCRA Wing) Govt. of India.

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