



## TiHAN-IIT: Testbed for Autonomous Navigation Systems

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### Why in News

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The foundation stone of ‘**TiHAN-IIT Hyderabad**’, India’s **first Testbed for Autonomous Navigation Systems** (Terrestrial and Aerial) has been laid recently.

### Key Points

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- **Background:**
  - The Department of Science and Technology (DST) had sanctioned **Rs. 135 crores** to **IIT Hyderabad** (IIT-H) under the **National Mission on Interdisciplinary Cyber-Physical Systems** (NM-ICPS) to set up a **Technology Innovation Hub on Autonomous Navigation and Data Acquisition Systems** (UAVs, RoVs, etc.)
  - The Technology Innovation Hub for **Unmanned Aerial Vehicles** (UAVs) and Remotely Operated Vehicles (RoVs) at IIT Hyderabad, known as '**TiHAN Foundation**' was incorporated as a **Section-8 company** by the institute in June 2020.
    - It is a multi-departmental initiative including researchers from electrical, computer science, mechanical and aerospace, civil, mathematics, and design at IIT-H with collaboration and support from reputed institutions and industry.
    - It is a great step towards '**Atmanibhar Bharat**', '**Skill India**' and '**Digital India**'.

- **TiHAN-IIT:**

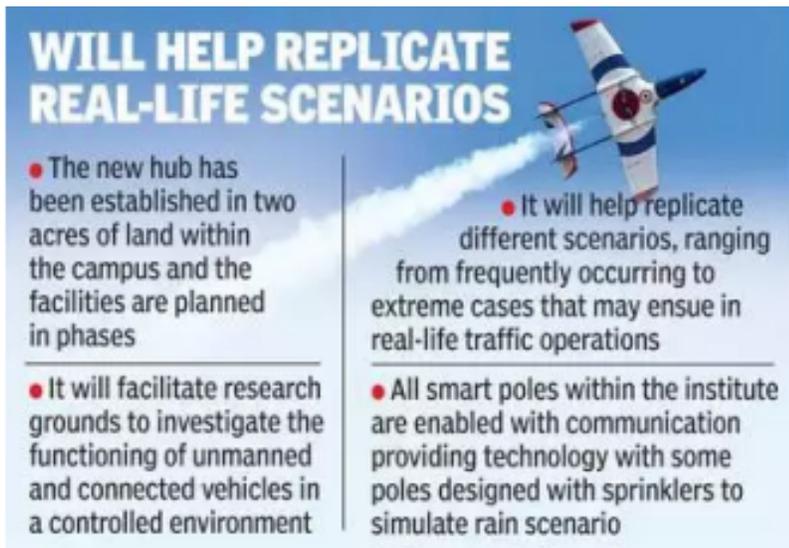
- It will **facilitate research grounds** to investigate the **functioning of unmanned and connected vehicles** in a controlled environment by replicating different scenarios, ranging from frequently occurring to extreme cases that may ensue in real-life traffic operations.
- At present, there is **no such testbed facility in India** to evaluate the autonomous navigation of vehicles. Therefore, it is envisioned to address this gap by developing a fully functional and exemplary testbed facility dedicated to **connected autonomous vehicles (CAVs)**.

**Connected vehicles use technology to either communicate with each other, connect with traffic signals, signs, and other road items, or obtain data from a cloud.** This information exchange helps with **safety and improves traffic flow.**

- This hub focuses on addressing various challenges hindering the **real-time adoption of unmanned autonomous vehicles** for both **terrestrial and aerial applications.**
- **Primary focus includes:**
  - **Research & Technology development** in the area of Autonomous Navigation and Data Acquisition Systems (UAVs, RoVs).
  - **Industry Collaborations :**  
Joint R&D Initiatives, Consultancy, Technology Outreach Schemes, Training of Industry Personnel, Continuing Education.
  - **Human resource & Skill development.**
  - **Innovation, Entrepreneurship & Start-up Ecosystem:**  
Start-ups and Incubation in the Technology Vertical, Attracting Private Funding (**Corporate Social Responsibility**, Voluntary Contributions and equity based), Technology Commercialization.
  - **International Collaborations :**  
Academia & Industry, Faculty/Student Exchange Programs.

- **Features of TiHAN-IIT:**

- **Total Area:**  
**2 Acres of land** has already been allocated in the IIT Hyderabad campus and the facilities are planned in phases.
- **Facilities:**  
Test Tracks, Emulation of Real-World Scenarios, State of the Art Simulation Technologies, Road Infrastructure, Drone Runways and Landing Area, Mechanical Integration Facility, Centralized Control Room/Ground Control Station, Smart Poles etc.
- **Promotion to research:**  
The developed test bed will be available for use **by all the industries, R&D labs, academia conducting research and development** in the broad areas of **autonomous navigation.**



**WILL HELP REPLICATE REAL-LIFE SCENARIOS**

- The new hub has been established in two acres of land within the campus and the facilities are planned in phases
- It will facilitate research grounds to investigate the functioning of unmanned and connected vehicles in a controlled environment
- It will help replicate different scenarios, ranging from frequently occurring to extreme cases that may ensue in real-life traffic operations
- All smart poles within the institute are enabled with communication providing technology with some poles designed with sprinklers to simulate rain scenario

### **National Mission on Interdisciplinary Cyber-Physical Systems**

- The NM-ICPS is a comprehensive Mission aimed at **complete convergence with all stakeholders by establishing strong linkages between academia, industry, Government and International Organizations.** The Mission will work with all the concerned Ministries/Departments to identify their technology needs, develop solutions and technical support in CPS implementation.
- It will secure India's future by creation of a **Cyber-Physical System** ecosystem.
  - Cyber-Physical System (CPS) **combines digital/cyber elements with physical objects** (e.g. machines, autonomous vehicles) and data with capabilities of communication, data collection & processing, computing, decision making and action.
  - CPS is an integrated system involving **Sensors, Communication, Actuators, Control, interconnected computing networks and data analytics.**
  - **Few Potential applications:** Driverless cars that communicate securely with each other on smart roads, Sensors in the home to detect changing health conditions, etc.
- **The Mission has four major activities:**
  - Technology Development,
  - Human Resource & Skill Development,
  - Innovation, Entrepreneurship & Start-Up Ecosystem and
  - International Collaborations.

**Source:PIB**