



15<sup>th</sup> July 2022

To whom it may concern:

Dear Sir/Madam

With reference to your email dated 14<sup>th</sup>, July 2022, the response to the Rajya Sabha Unstarred Question **No. 356** is as follows:

1. Technology Innovation Hub on Autonomous Navigation (TiHAN) at IIT Hyderabad (IITH) is conducting Drone research in the following areas:  
Autonomous UAVs in different categories for various applications: Under DST NMICPS Technology Innovation Hub on Autonomous Navigations (TiHAN) at IITH, R&D on drones of different categories catering to various applications are being carried out at IIT Hyderabad. Under this initiative, Testbed on Autonomous Navigation (Aerial & Terrestrial) has been set up for testing and validating the autonomous ground and aerial vehicles. Briefly following are the activities:
  - Nano/Micro category drones, Bio-Inspired drones like Quad-wing UAV (Dragonfly based) and Flapping Wing Micro Aerial Vehicles (Aerial Birds based), Nano drone swarms, which are used for various applications including Defense Applications: Reconnaissance, stealth operations etc., Space Exploration: Insect based UAVs are more suitable for exploration of Mars, Jupiter and Titan planets that have low gravity atmospheres, etc.
  - Small category drones, technology development for integration of high end sensors like Hyperspectral cameras, Multi-spectral cameras, Lidars, thermal imagers, etc. on to UAVs which are useful for applications like agriculture, land surveillance, healthcare, etc. Very closely working with the agriculture universities like PJTSAU, ICRISAT. Also working with the University of Tokyo in the area of Drone based sensing for high throughput phenotyping and genotyping applications.
  - Medium/Large category drones, Focus on developing solutions for heavy payload drones - Air Cargo, next generation urban air mobility – air taxis, air metros, air ambulances etc. As a means of solving traffic congestion in the downtown of a large city. Air-cargo drones have been built and being tested at IITH.
  - Technologies for accurate navigations, GPS denied environments, drone swarms, BVLOS are being developed for different applications based on end-user requirements.



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2. Course offered on drones

Course Title: Introduction to Drones which covers the following: Introduction to UAVs/Drones, Drone Applications, Working Principle and Design, Inertial Measurement Unit, Sensors and Calibration, PID - Implementation and Tuning, Flight controller, Remote Controller, Quadcopter dynamics.

If you have any questions, please feel free to contact me.

Yours Sincerely,

**Prof Kiran Kuchi**

Professor and Dean R&D, IIT Hyderabad,