Innovations @ Indian Institute of Technology Hyderabad

IIT Hyderabad (IITH), established in 2008, is ranked among the top 10 Engineering institutions in India in National Institute Ranking Framework (NIRF) for the past 8 years, ever since NIRF rankings have been started (ranked 8 in 2023 rankings). IITH is ranked 3rd in NIRF-Innovation Rankings-2023, crossing many older IITs (Bombay, Delhi, Kharagpur, Guwahati and Roorkee). In QS 2024 world rankings IITH is ranked 691-700 and ranked 11th among Indian engineering institutions. IITH has been striving for excellence passionately with a motto of "*Inventing and Innovating in Technology for Humanity (IITH)*". The unique features of IITH and the recent initiatives are captured below.

Some Important Statistics:

- 4200+ students (1200 PhD, 1300 PG, 1700 UG students), ~300 faculty and ~300 staff.
- 9000+ Scopus publications with 1,35,000+ citations, 2220+ projects worth of Rs. 890+ Cr, 190+ patents and 130+ startups (which have created 1000+ jobs and Rs. 1200+ Cr revenue).

1. Academic Innovations:

1.1 Several Firsts:

- First institute in India to start Fractal Academics.
- First among the IITs to start unique BTech (UG) programs such as (a) Artificial Intelligence (b) Biomedical Eng., (c) Biotech. & Bioinformatics, (d) Industrial Chemistry and (e) IC Design & Technology.
- First multidisciplinary BTech program among IITs on Computational Engineering to create computational engineers for manufacturing industry instead of software industry.
- The BTech curriculum at IITH provides semester-long internship with 6 credits (6th semester, Jan-July) to get connected to industry (first among IITs to introduce this).
- The first IIT to set up a department of Heritage Science and Technology (HST) that offers an MTech in HST.
- Unique BTech in Engineering Sciences (first among IITs), where students can pick up any courses of their choice to graduate.
- First to start BTech in IC Design & Technology. MTech in Systems Packaging, Microelectronics & VLSI, E-Waste Management and Semiconductor Materials and Devices to support India Semiconductor Mission.
- MTech in Techno-Entrepreneurship (first among IITs), student develops a prototype and a business model to commercialize it.
- IITH is introducing a unique Open to All Teaching (OAT) program from Aug 2023 to open its courses to the whole world through hybrid classrooms (first among IITs).
- First IIT to offer a Diploma after completing 50% BTech courses.
- Fellowship for International Research Scholars in Technology (FIRST) to attract foreign students to do PhD at IITH.

1.2 Unique Departments & Programs:

- A flexible BTech curriculum that has 10% basic sciences, 10% basic engineering, 60% professional major, 10% liberal/creative arts and 10% free electives.
- Unique departments such as AI, Climate change, Design, Liberal arts, Entrepreneurship & Management, a School of Innovation & Entrepreneurship and a School of Sustainability.
- IITH offers Double Major in all branches of UG, including a Double Major in Entrepreneurship.
- IITH offers several industry focused multidisciplinary MTech (PG) programs such as Additive Manufacturing, Energy, Sensors, Smart Mobility, Systems packaging.
- Joint PG programs with other organisations: E-waste management (with CMET), Smart mobility (with TiHAN), Additive manufacturing (with DRDO), Sustainable Engineering (with Greenko).
- Joint PG programs with hospitals: MTech in Medical Device Innovation (with AIG, wherein the student goes through 4-month immersion in a hospital and develops a medical device), MTech in

Ophthalmic Engineering (with LVPEI) and MSc in Medical physics (with Basavatharakam Cancer hospital, wherein the student spends 1 year in cancer hospital to become radiation expert).

- Online MTech programs such as EV Technology, Computational Mechanics, Integrated Computational Materials Engineering (ICME), Industrial Metallurgy, Microelectronics & VLSI, HST, and MDes, for working professionals. The program gives flexibility with 4 years to complete it with an exit option of Executive MTech after completing Coursework.
- MTech projects (~50%) on industry defined problems.
- Waived residential requirement for PhD for working professionals.
- Supporting Innovations by the students through BUILD (Bold & Unique Ideas Leading Development) projects and providing a semester break with 6 credits to students to pursue such innovations. This year the BUILD project support is extended to students from the whole country.
- Creating research culture among BTech students of 9 NITs (5 from northeast) by enabling them to spend their final year BTech at IITH.

2. Research Innovations:

2.1 Thrust Areas & Centres:

- Thrust Areas: AI/ML, Future communications, Autonomous navigation & smart mobility, Healthcare, Semiconductors & Devices, Advanced Materials, Climate change & Sustainability, Additive manufacturing, Entrepreneurship, Energy, Sensors.
- India's first Testbed for autonomous vehicles – TiHAN.
- Leading in 5G/6G - developed India's first 5G NB-IOT Chip, which has gone for mass production.
- 4 Incubators for startup support: ITiC for technology, Centre for Healthcare Entrepreneurship (C*f*HE) for medical innovations, FabCI for fabless chip design and TiHAN.
- Centre of Excellences (CoEs) in Additive Manufacturing (supported by DRDO), Medical Devices (supported by ICMR) and Transportation (supported by NHAI) and IITH-DRDO DIA CoE.
- India's first NVAITC (NVIDIA AI Technology Center).
- Rural Development Centre (RDC) to support rural innovations.
- 850 Teraflop high-performance computing (HPC) facility.
- Centre for Research and Innovation in AI (क्रिया) established.
- Established Technology Research Park (TRP, for industries to collaborate with IITH) and Technology Incubation Park (TIP, for startups) with 150,000 sft each.
- IITH-NIMS (Tsukuba, Japan) Research Centre has been established.

2.2 Developing Innovation support System:

- A Dean position for Innovation, Translation & Startups and a Technology Transfer Office to support technology development with higher TRL levels.
- Effective utilization of research facilities through slot booking using a web portal.
- Supporting research eco-system in India by making 480 equipment of IITH available on I-STEM portal (highest by any institute in the country).
- FRIENDSHIP program with Japan.
- Joint Doctoral program with several universities- Swinburne University of Technology, Deakin Univ., Australia, and National Tsing Hua Univ., Taiwan.
- G20 event on Digital Technologies including 5G/6G and Autonomous navigation held at IITH.
- Model G20 event being held at IITH for students of almost 65,000 colleges of India.
- Coordinating Glue Grant Scheme of MoE to address grand challenges of India from Hyderabad.
- Generated the Database for VAIBHAV conducted by MoE.
- Maintaining Research Scholars Database for all IITs.
- IITH is taking the major lead to develop competent human resources in the Semiconductor field.