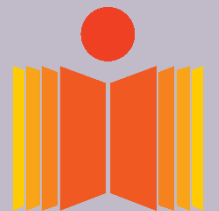# IIT HYDERABAD (2008)

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भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

Academic Block A

The greatest danger for most of us is not that our aim is too high and we miss it, but that it is too low and we reach it

--Michelangelo

If people are not laughing at your goals,
your goals are too small

-- Azim Premji (WIPRO)

IIT System

- **In all 23 IITs**
  - 5 earlier ones (1951–IITKgp, 1958-IITB, 1959-IITM, 1960-IITK, 1961-IITD)
  - IIT Guwahati (1914)
  - IIT Roorkee (2001)
  - 6 IITs (IITH, IITGn, IITP, IITRp, IITBh, IITJ,) in 2008
  - 2 IITs (IIT Mandi and IITI) in 2009
  - IIT BHU in 2012
  - 7 IITs (IIT-Palakkad, IIT Tirupati, IIT Dharwad, IIT Goa IIT Bhilai, IIT Jammu, IIT Dhanbad) 2015, 2016

- **All 23 IITs declared Institute of National Importance by Act of Parliament**

- **IIT Council Chaired by Honorable Minister of Human Resource Development**

Location of the 23 Indian Institutes of Technology

IIT System ...

- **Approximately 75,000 students in al 23 IITs**
  - About 12,000 Ph.D. students
  - About 25,000 Masters (Thesis) students
  - About 38,000 Undergraduate students

- **Close to 25,000 Scopus Indexed publications per year**

- **State of art research Labs in all areas of engineering**

- **Our alumni occupy very high positions across the globe**

- **IIT System in engineering was ranked 3rd in world**

- **5 Olds IITs consistently appear in top 200-300 in the world ranking, some appear in the 1op 100**

IITs ranked No. 3 in the world

Rashmee Roshan Lall | TNN

London: The IITs have been placed number three in global rankings of the world's 100 best technology universities, exactly one week after they ignominiously slid several notches down another authoritative league table tracking the overall excellence of 100 institutions.

The Times Higher Education Supplement's listing of 100 top technology universities published on Friday ranked the IITs just behind MIT and California University, Berkeley.

It also placed IIMs at number 68, sandwiched between Hong Kong University and Eindhoven in the Netherlands.

Martin Ince of THES told TOI the new tech survey "shows academic opinion about the top places for science and engineering and puts IIT ahead of Imperial College, London", which comes in at number four. The survey is a

REPORT CARD

1. MIT
2. University of California, Berkeley
3. IIT
4. Imperial College, London

subset of the main data collated by THES for last week's overall excellence rankings.

Education experts said Friday's rankings of technology and science institutes will be a balm for the bruised IITs. Last week's THES overall global excellence rankings placed them at number 57 of the top 100, seven notches lower than in 2005.

Ince said the newest tech table emerged from THES's "total universe" of 3,703 academics, who had been asked to rate universities in their area of specialisation.

Even though the technology education sector is bursting with big names, such as Stanford and Cambridge, the IITs held their own. But they featured rather lower at number 33 when the world's 100 best science universities were ranked by THES.

On the science league table, IITs squeezed in behind China University of Science and Technology and just ahead of Michigan University. Cambridge leads the table.

IIT Hyderabad

Student Strength Aug 2017

Program	Male	Female	Total
B.Tech	808	150	958
M.Sc	85	36	121
M.Tech	370	89	459
M.Des	21	11	32
M.Phil	05	05	10
Ph.D	**558**	**190**	**748**
Total	1847	481	2328

FACULTY @IITH

~185 faculty – many in the picture

Some Innovations in Academics

1. **Fractal Academics Implemented at IITH**
   a) **Innovative and first of its kind academic program (https://www.iith.ac.in/fractal/frac.html)**

2. **Digital Fabrication Lab (3D-Printing) for first semester students – first of its kind in academia**

3. **An Executive M.Tech. Program in Data Sciences for working professionals only; first of its kind in India (https://cse.iith.ac.in/?q=node/136)**

4. **All Course Option M.Tech.**

5. **Minor in Entrepreneurship for all students. All the modules taught by VCs, Entrepreneurs, Business Professionals only. Once again first of its kind**

6. **Double Major: A student can get B.Tech. in two disciplines in 4 to 5 years**

7. **Engineering Science Program**

8. **Creative Arts Series in the academic curriculum**

9. **Study Abroad Program by UT Austin students at IITH**

Some New

1. **Center for Healthcare Entrepreneurship**
   - ◦ **Funded by two IIT Bomby Alumni ~~ 2 mil US$**

2. **Design Innovation Center**
   - ◦ **Funded by MHRD ~~ 1.8 mil US$**

3. **Technology Learning Center**
   - ◦ **Funded by MHRD ~~ 1 mil US$**

4. **Fabless Chip Design Incubator**
   - ◦ **Funded by MEITY ~~ 4 mil US$**

5. **Research Park**
   - ◦ **Funded by DST / MHRD ~~ 10 mil US$**

6. **Technology Incubation Center (iTIC)**
   - ◦ **Funded by DST ~~ 1 mil US$**

Research Culture at IITH

|	
Total Sanctioned Sponsored Project Funding	*~ 300 crs – US$ 44.00 mil*
Industrial Funding	~15 crs – US$ 2.0 mil
Consultancy Funding	~ 6 crs – US$ 92 K
Patents Filed	45
Journal publications by IITH Faculty and students (as recognized by Scopus)	1000+
Reviewed Conference publication by IITH Faculty and students (as recognized by Scopus)	500+
Presentation by IITH faculty at National and International conferences and reputed institutes	500+

Large Sponsored Projects

- **SATREP – DISANET – (25crs – US$ 3.85mil)**

- **SATREP – M2SMART --- (~ 30 Crs – US$4.5mil)**

- **Converged Cloud Communication (~20cr – US 3.0 mil)**

- **Cyber Physical Systems (DEITY) (~17 cr – US$ 2.6 mil)**

- **5G Networks   (~8cr – US$ 1.2 mil)**

- **IoT for Smarter Health Care (DEITY) (~4cr – US$ 615K)**

- **Sustainable Development (MHRD) (4cr – US$ 615K)**

- **Self Powered Wireless Chipset for Building to Building Communication (DEITY) (~2cr – US$ 300K)**

- **IUATC Project (DST) (~1.7cr – US$ 261K)**
  - *WSN for pollution monitoring, and Health Care*

- **Development of FRET Enhanced Quantum Dot Sensitized Solar Cells (DST) (1.33cr – US$ 205K)**

- **Improving the efficiency of Dense medium Cyclone treating high NGM coal using GPU based CFD and PEPT techniques (NMDC) (~1.6cr – US$ 246K)**

- **Incremental Sheet Metal Forming: Predictive Modelling and Validation (Boeing) (~1.0cr – US$ 153K)**

- **Evaluation of Fly Ash Treated Recycled Asphalt Pavement (RAP) for Base/Subbase Construction (DST) (~1cr – US$ 153K)**

Some Research Equipment
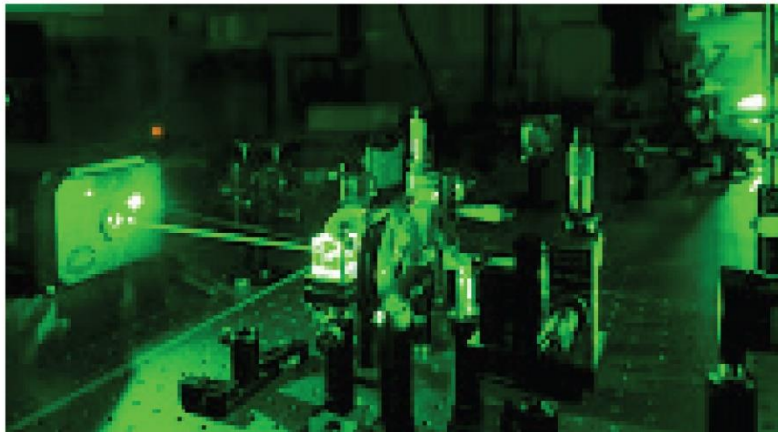
Cross-disciplinary research: *A central focus at IITH*

Research Centers

Healthcare Entrepreneurship

Cyber-physical systems

Nano-X (Inaugurated by Prof. C N R Rao)

X-Materials

High Performance Computing

Sustainable Development

PMMNMTT Technology Learning Center

Design Innovation Center

Center for Fabless Chip Design

In the Offing

Center for Things to Bytes to Things

Nano-X (Inaugurated by Prof. C N R Rao)

IITH-Industry Interaction

IIT-H has active collaborations and/or interactions with Industries

- DRDO
- Hyundai Motors
- Mercedes-Benz R&D India
- HP
- Microsoft Research
- Xylinx Research
- NICT-Japan
- OFS-Alcatel
- KDDI Research labs-Japan
- CMC
- RCI
- ANURAG
- Astra
- LVPEI
- …

- ELGI
- HCL technologies
- Redpine
- Intel
- Dr Reddy's labs
- Singareni Colleries
- nVidia Technology
- Boeing (India)
- Cyient
- Samsung
- URMI
- Tata Steel
- Ams AG, Austria
- CRIDA and IMD
- Allied Telesis Labs Limited
- …

- CSIR-NGRI Hyderabad
- Progress Software Development Pvt. Ltd.
- RedPine Signals
- Mateoroligical Department (IMD)
- Nanoengineering
- Rahyals Energy India Pvt. Ltd.
- ARCI
- Delhi Mumbai Industrial Corridor Development Corporation
- BHEL
- Honeywell

ACADEMICS *(Teaching)*

Academic Departments: *In all 14 Departments*

9 Engineering Departments

- Department of Biomedical Engineering (M.Tech., Ph.D.)
- Department of Biotechnology (M.Tech., Ph.D.)
- Department of Chemical Engineering (B.Tech, M.Tech and Ph.D.)
- Department of Civil Engineering (B.Tech, M.Tech. Ph.D.)
- Department of Computer Science and Engineering (B.Tech., M.Tech., Ph.D.)
- Department of Electrical Engineering (B.Tech., M.Tech., Ph.D.)
- *Department of Engineering Science (B.Tech.) (virtual department)*
- Department of Materials Science & Metallurgical Engineering (M.Tech., Ph.D., B.Tech.)
- Department of Mechanical and Aerospace Engineering (B.Tech., M.Tech., Ph.D.)

Sciences

- Department of Chemistry (M.Sc., Ph.D.)
- Department of Mathematics (M.Phil, Ph.D.)
- Department of Physics (B.Tech.,M.Sc., Ph.D.)

Liberal Arts (M.Phil, Ph.D.)

Department of Design (M.Des., Ph.D.)

Only new IIT to have a full bouquet of departments

9 Departments offer B.Tech program

3 departments offer M.Sc.

8 Departments offer M.Tech. programs

1 Department offers M.Phil. Program

1 Dept. offers M.Des.

13 Departments offering Ph.D. programs

B.Tech. Minor is all depts. including Economics, etc.

Minor in Entrepreneurship for all

Option of Double Major for B.Tech. Students

Flexible Academic Structure

- *Fractal Academics*
- *Double Major*
- Minors and Honors
- **Engineering Science**
  - Selection of a branch after 4 semesters of Engrg Science
  - Possibility of B.Tech. in the area chosen after 4 semester in the Engrg. Science Stream
  - Possibility of doing a full Engineering Science BTech
- 5 year Dual degree possibility after two years if the candidate desires to purse B.Tech. + M.Tech.
- *Creative Arts Series (e.g. fractal courses taught by professionals in art and design -- like Theater, Music, Movie Making, Madhubani Painting, Kalamkari Painting, Dance, etc.)*
- *Minor in Entrepreneurship*
- **Actively moving towards project based learning rather than only lecture based learning**

FRACTAL ACADEMICS

Philosophy *Fractal Academics Captures:*

I. **T-Education --** *Breadth with Depth*

I. **Flexibility**

II. **Atomize courses (Fractional Credits)**

III. **Foster Interdisciplinary education**

IV. **Wider choice of electives**

V. **Very early exposure to new technology development**

VI. **Foster Research at undergraduate level**

VII. **Synergy in projects – hopefully leading to products**

VIII. **Students can pace their program**

IX. **Encourage creativity**

BREADTH

DEPTH
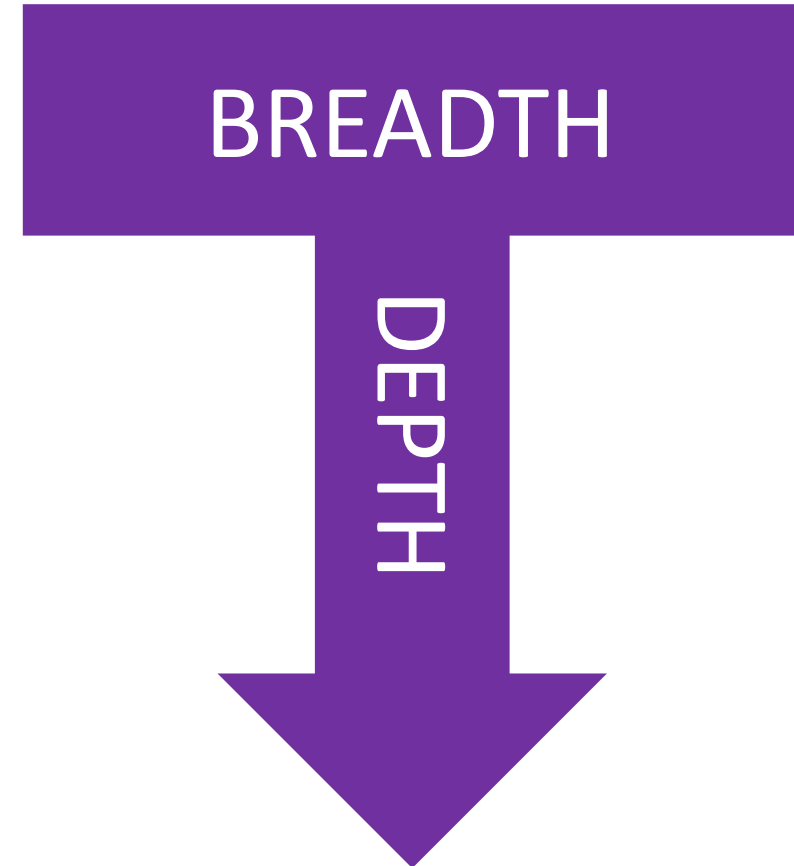
A sample First Semester Fractal Academic Program For Electrical Engrg. Students

Semester 1 Courses (Credits) Total Credits: 15	Duration					
	1/6	2/6	3/6	4/6	5/6	6/6
1. Independent Project (1)	←					→
2. Digital Fabrication (2)	←					→
3. Calculus – I (1)	←	→				
4. Calculus – II (2)			←			→
5. Classical Physics (1)			←	→		
6. Electric Circuits (1)	←	→				
7. Magnetic Circuits (1)			←	→		
8. Digital Logic Design (1)					←	→
9. Digital System Design (1)					←	→
10. Signals and Communications (1)					←	→
11. Internet of Things (1)	←	→				
12. Bioengineering (1)			←	→		
13. Liberal Arts/Create Arts Elective (1)	←					→

International Collaboration

MoU	
University of NEWCASTLE, Australia	University of British Columbia
University of Applied Sciences, CSE Dept., Germany	Columbia University
University of Utah, Salt Lake City, USA	Purdue University
Georgia Institute of Technology, Atlanta, USA	McMaster University
The University of Illinois at Urbana-Champaign, USA	Keio University, Tokyo
University of California, Santa Cruz, USA	The National Institute of Information and Communications
University of California, San Diego, USA	Technology of Japan
University of Buffalo, USA	Hiroshima Univ., Japan
University of Southern California, Los Angeles, USA	Osaka University, Japan
North Eastern Univ. Boston, Univ. of Rochester, USA	Univ. of Tokyo, Japan
Johns Hopkins University, USA	Ritsumeikan University, Japan
Texas A&M University, USA	Tahoka Univ, Japan
Hogskole I Gjovik (HIG), Norway	Temple University
Deakin University Australia	Hokkaido University
Four Way MoU with National Yunlin University of Science and Technology, Hsinchu Science Park, Central Taiwan Science Park and IIT Hyderabad	Waseda University
	…
…	

Active Collaboration with Japan

- **Several building on IITH campus to be built with JICA support**
- **Some iconic buildings designed by Japanese Architects – Pro-Bono**
- **Very Active student and Faculty Exchange – under Friendship Program**
- **R and D Collaboration in 5 Areas:**
  - **Next Generation Communication Technologies**
  - **Sustainable Development**
  - **Manufacturing and Design**
  - **Nano-Science and Nano-Technology**
  - **Energy and Environment**
- **Sponsored project from KDDI, Hitachi, and other Japanese companies**
- **Cultural Collaboration – Shirucafe!**
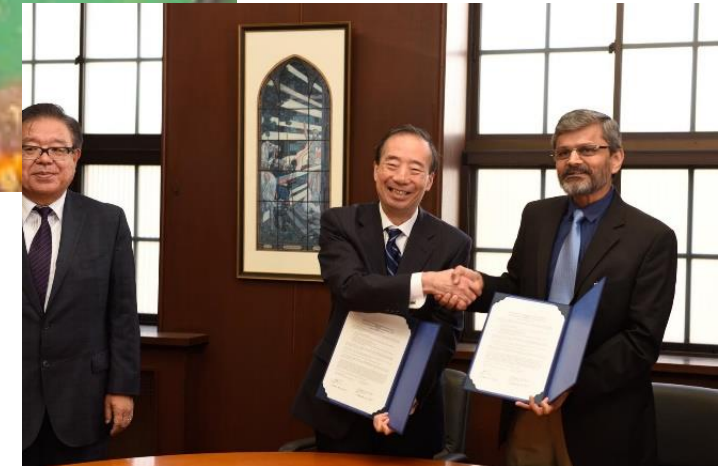
Very Strong Academic Interaction with Japanese Univ

UoT (MOU, Academic exchange, iSchool @IITH, Participation in academic Fair, Special lectures @IITH, student meeting program September 2015, receiving FRIENDSHIP scholars, New Campus Design, DISANET)

Osaka Univ.(MOU, Academic exchange, Coupling internship, Participation in Academic Fair, Special lectures @IITH, receiving FRINEDSHIP scholars, and short-term study in Japan, DISANET)

Ritsumeikan Univ.(MOU, Academic exchange, Inviting IITH Director and faculty to Symposium, Special lectures @IITH, Student exchange program September 2015, receiving FRIENDSHIP scholars)

Keio Univ.(MOU, Academic exchange, special lectures @IITH, receiving FRIENDSHIP scholars, DISANET)

Waseda Univ.(Academic exchange, Participation in academic Fair, Special lectures @IITH, receiving FRIENDSHIP scholars)

Tohoku Univ.(Academic exchange, receiving FRINEDSHIP scholars)

Kyoto Univ.(Academic exchange, Special lecture @IITH, receiving FRIENDSHIP scholars)

Nagoya Univ.(Academic exchange, receiving FRIENDSHIP scholar)

Kyushu Univ.(Academic exchange, Special lecture @IITH, receiving FRINEDSHIP scholar)

Interaction with other universities and institutes]

Tokyo Institute of Technology (Academic exchange, Student workshop @IITH)

Tokyo University of Agriculture and Technology (Academic exchange, Special lecture)

Japan Advanced Institute of Science and Technology (Visit to IITH)

Shizuoka Univ.(Academic exchange)

Toyohashi Univ. of Technology (Academic exchange)

Saitama Univ. (Academic exchange)

Nara Institute of Science and Technology and Hiroshima Univ. (DISANET)

Tokushima University (Academic exchange)

Hokkaido University(Special Lecture)

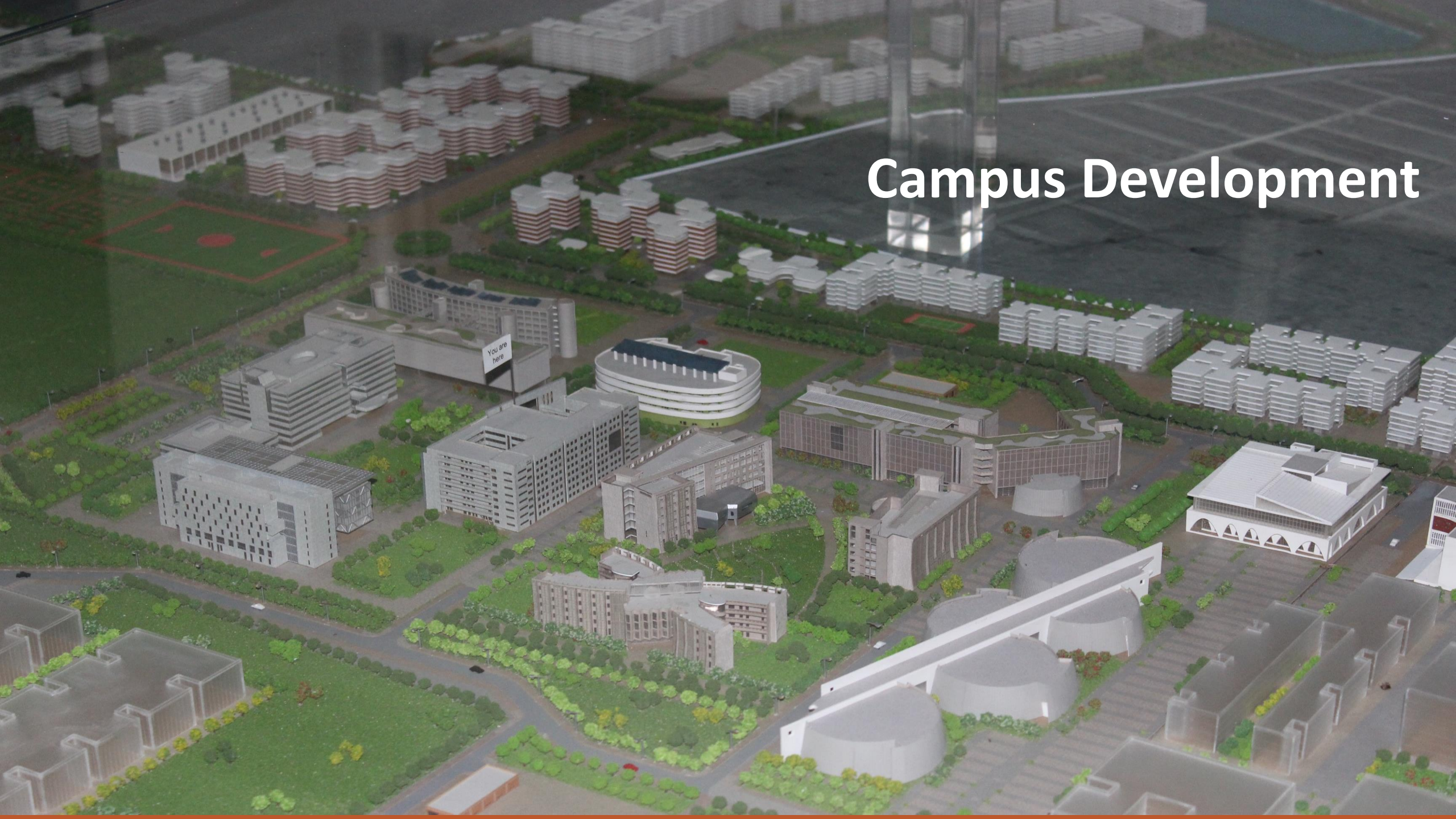Aichi Institute of Technology (Academic exchange, Special Lecture)

National Institute of Technology, Tsuruoka College (Special Lecture)

Saga University (IITH faculty visit)

Tokyo University of Arts (IITH faculty visit)

Musashino Art University (IITH faculty visit)

Campus Development

Possible modes for collaborations with universities overseas

- *Student exchange (two way)*

- *Summer Internship (two way)*

- *Double Degree programs*

- *Faculty exchange (two way)*

- *Offering of highly specialized modules (Fractional Credit Courses)*

- *Bidding for joint projects*

- *Establishment of Research Centers in cutting edge areas*

- *Member of Doctoral Committee of Ph.D. students*

- *Co-Guiding of Ph.D. students*

- *Any other avenues which could lead to a Win-Win situation*

Wilhelm von Humboldt on the future University of Berlin (1810, cited by Elton, 2005, 110)

".. universities should treat learning as not yet wholly solved problems and hence always in research mode"

Many Thanks