Educating Technology Leaders for Design-Driven Innovation

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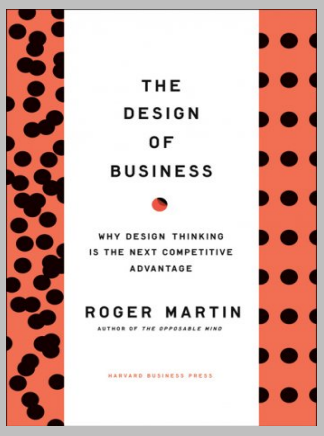
PICMET'14 Conference
July 30, 2014

Innovation IP
Design for Business
Invention Design
Entrepreneurship
Big-D Design

Design Thinking in Business

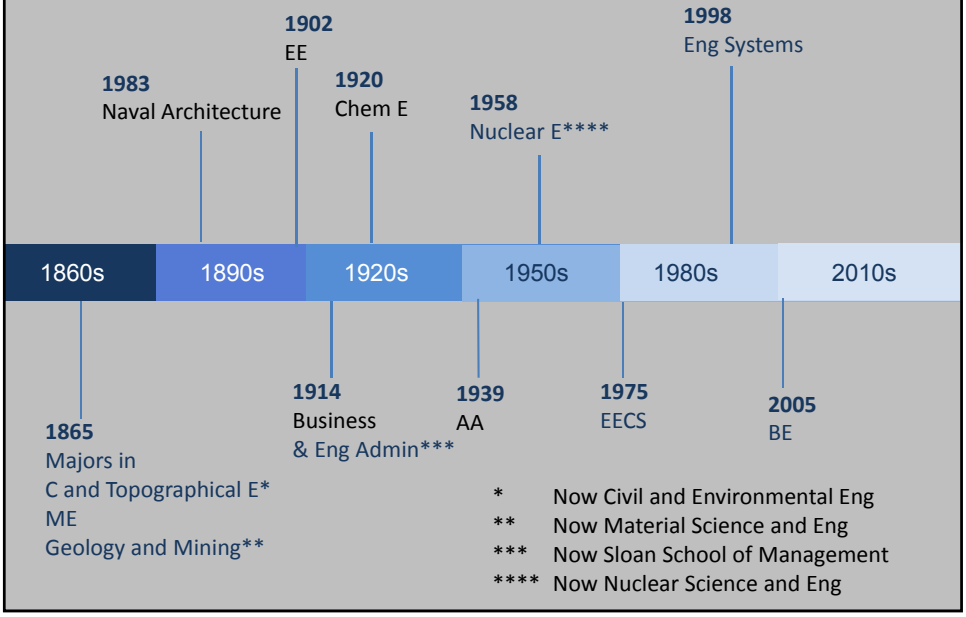


Guiding Premises

- **Technology and design are pervasive and essential for a vibrant society**
- **Common design knowledge, principles, practice and skills cut across many fields**
- **Successful technology-based design requires**
  - strong foundations in basic mathematics, sciences and technology
  - grounding in the arts, humanities and social sciences
  - coupled effectively with hands-on experiential learning
- **Technology leaders (innovators, engineers) are in short supply**

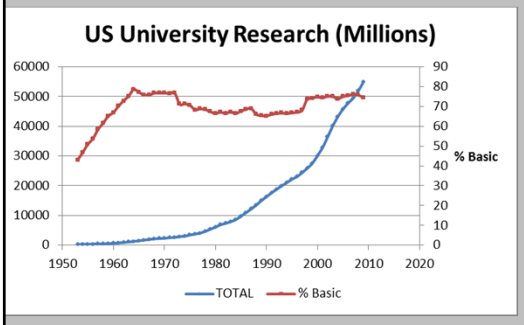
How did we get to where we are

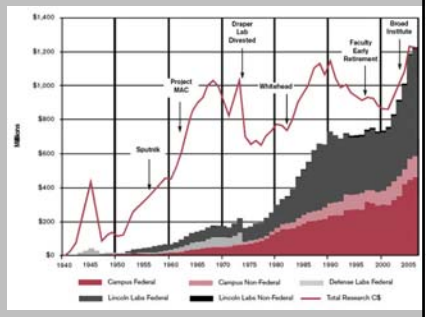
Timeline MIT Engineering Departments

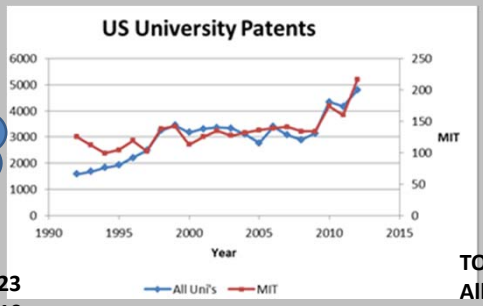


* Now Civil and Environmental Eng
** Now Material Science and Eng
*** Now Sloan School of Management
**** Now Nuclear Science and Eng

MIT Research Expenditures (FY1940-2006)



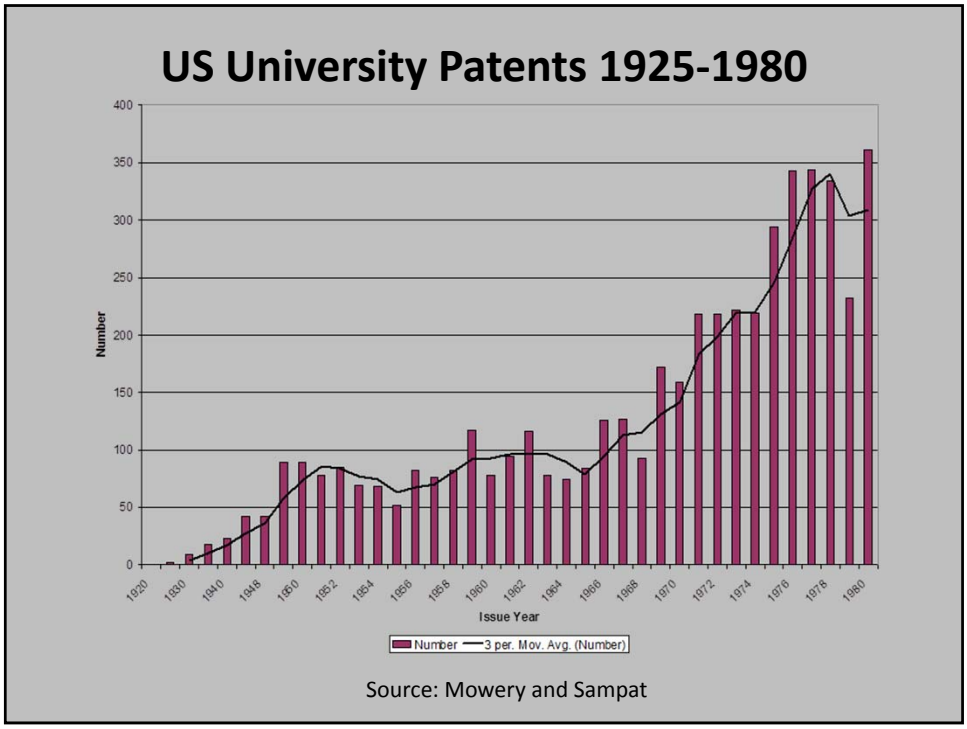


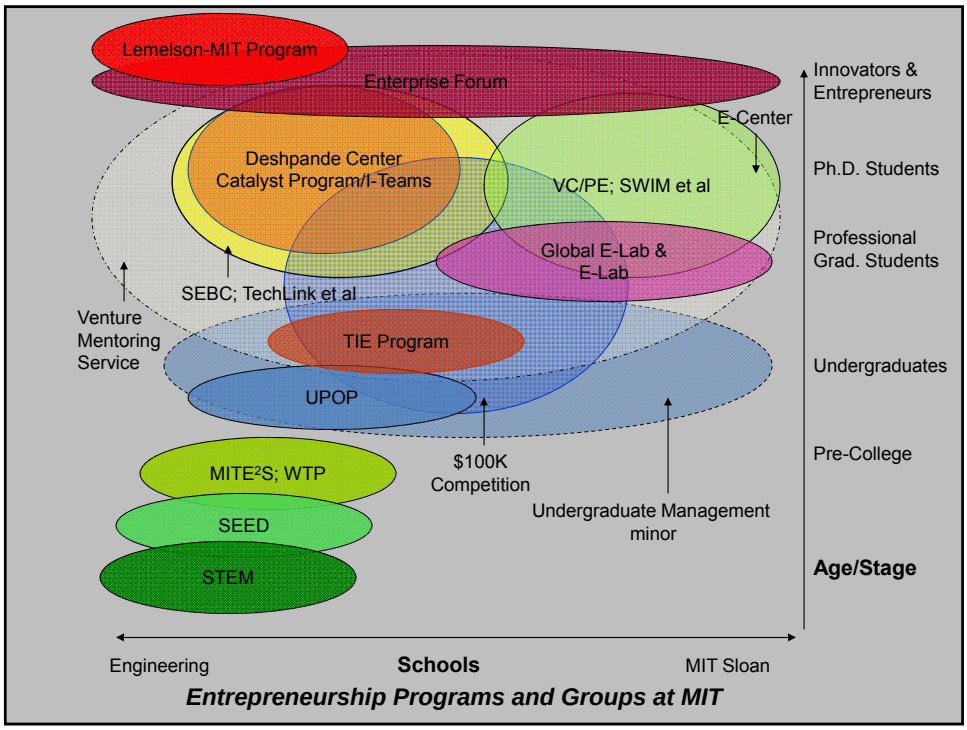


Bayh-Dole Act 1980

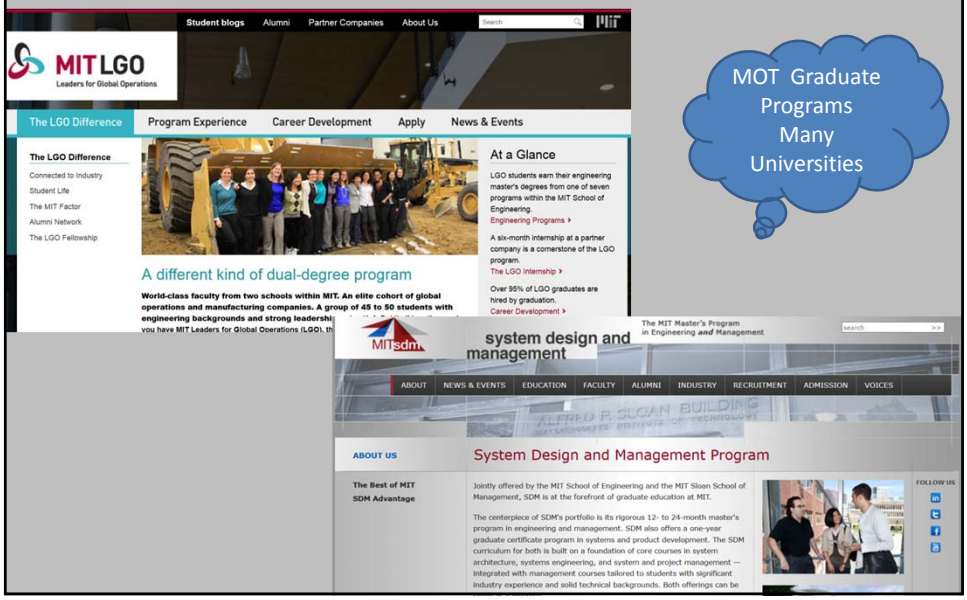
PRE 1992
All Unis = 12,123
MIT = 1,210

TOTAL (to 2012)
All Unis = 75,353
MIT = 4,017


US University Patents 1925-1980
Number
Issue Year
Number
3 per. Mov. Avg. (Number)
Source: Mowery and Sampat


Lemelson-MIT Program
Enterprise Forum
E-Center
Deshpande Center
Catalyst Program/I-Teams
VC/PE; SWIM et al
Global E-Lab &
E-Lab
SEBC; TechLink et al
Venture
Mentoring
Service
TIE Program
UPOP
$100K
Competition
MITE²S; WTP
SEED
STEM
Undergraduate Management
minor
Innovators &
Entrepreneurs
Ph.D. Students
Professional
Grad. Students
Undergraduates
Pre-College
Age/Stage
Engineering
Schools
MIT Sloan
Entrepreneurship Programs and Groups at MIT

Masters Eng &Management



MOT Graduate Programs Many Universities

MIT to the Marketplace

Living MIT Alumni	
Companies Founded	25,000
Number Employees	3.3 million
Annual Revenue ($)	1.1 trillion

TLO 2012	
Invention Disclosures	694
U.S. Patents Filed	305
U.S. Patents Issued	199
Licenses	81
Trademark Licenses	139
Options	26
Companies Started	16

Undergraduate education

BIG Questions

Designing A World Class Innovation University

Intellectual and Programmatic Footprint?

Organization?	Staffing?
Culture?	Research?
Degrees?	Societal impact?
Curricula?	Facilities?
Pedagogy?	Technology?

Path to Greatness?

Singapore Public R&D Expenditures

National Technology Plan (1991-1995) **S$2 billion**

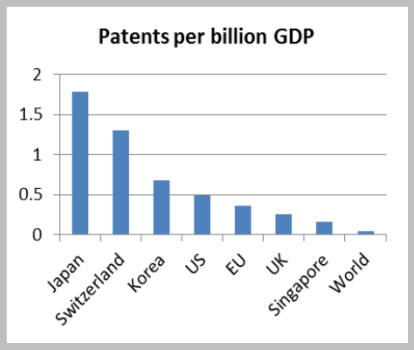
National Science & Technology Plan (1996-2000) **S$4 billion**

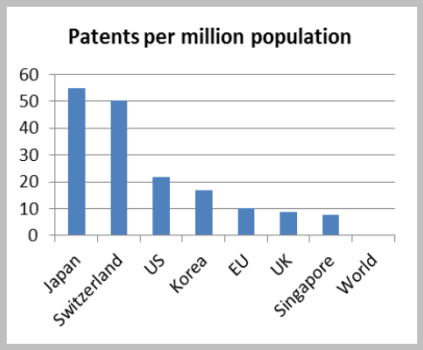
Science & Technology Plan 2005 (2001-2005) **S$6 billion**

Science & Technology Plan 2010 (2006-2010) **S$13.9 billion**

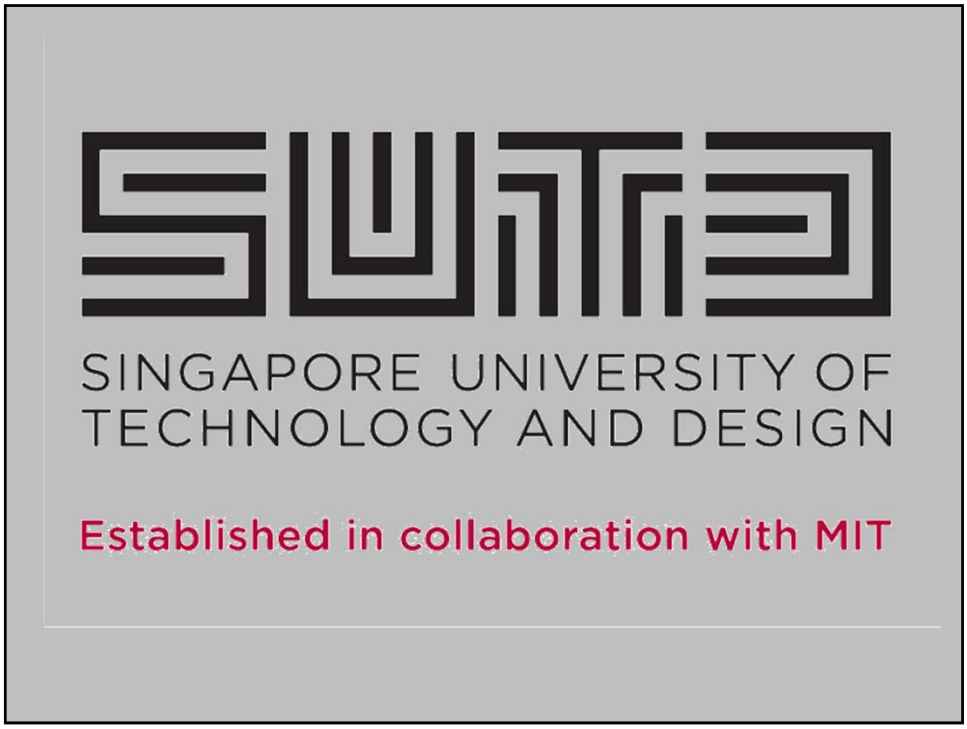
Research, Innovation & Enterprise Plan 2015 (2011-2015) S$16.1 billion

8 Fold Growth over 25 Years





Patents 2005-2010
Population and GDP data from World Bank; Patent data from OECD



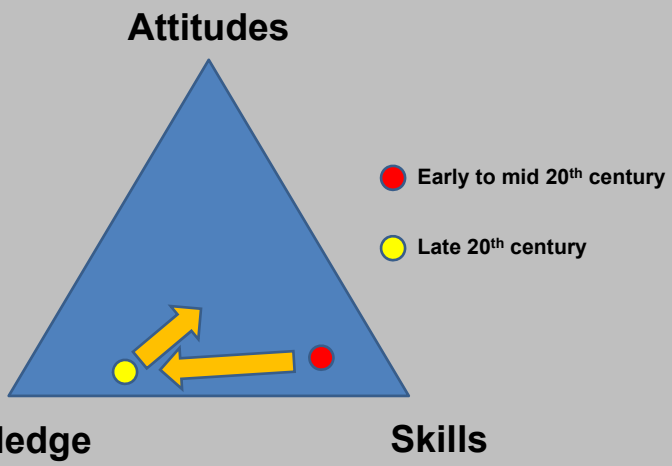
SUTD's Unique Value Proposition

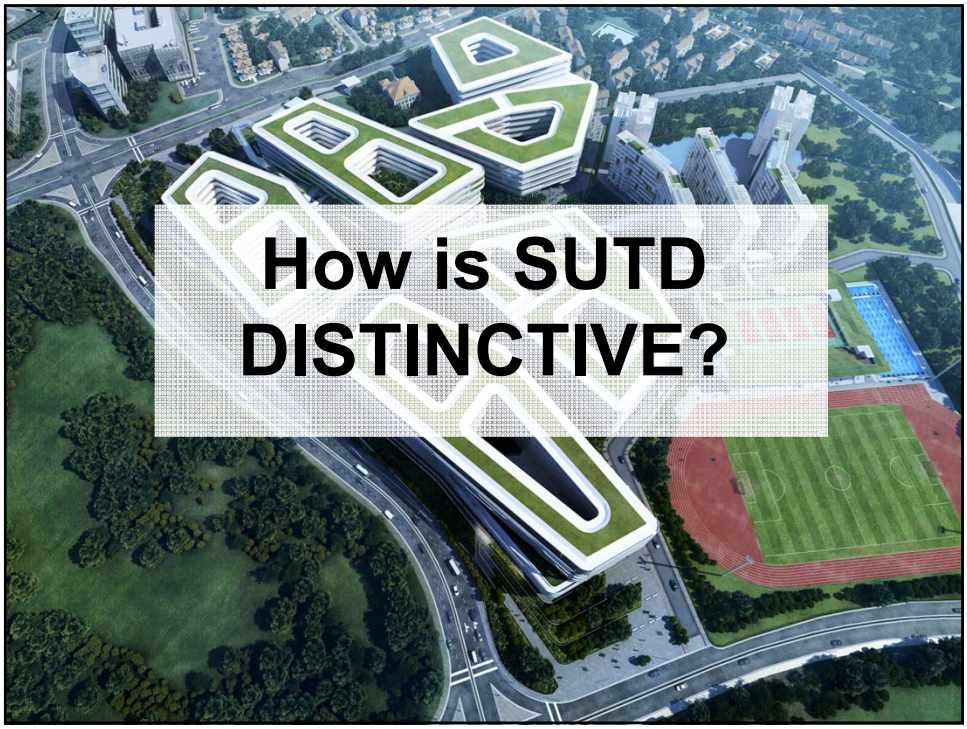
Mission	o To advance knowledge and nurture technically grounded **leaders and innovators** to improve lives o Focus on **Design** through integrated multi-disciplinary curriculum and multi-disciplinary research
Values	Leadership • Integrity • Passion Collaboration • Creativity
Distinctiveness	o Innovative education for science & engineering talents o Emphasis on **Technology, Innovation, Entrepreneurship** o Develop graduates with ideas and solutions that have real-world impact and use
Strategic Collaborations	MIT · Zhejiang University · SMU

Collaboration with partner universities

Massachusetts Institute of Technology	• Curriculum development (87 courses) and co-teaching • Recruitment and training of SUTD's faculty • Student exchange • Research collaboration • SUTD-MIT International Design Centre
ZHEJIANG UNIVERSITY 1897	• Development of 5 elective courses • Research collaboration • Student exchange
SMU Singapore Management University	• Co-development of 5 elective courses • Research collaboration • Student exchange • Advanced placement for graduate school • Dual degree undergraduate program

Evolution of Engineering Education




How is SUTD
DISTINCTIVE?


design
design
design
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design
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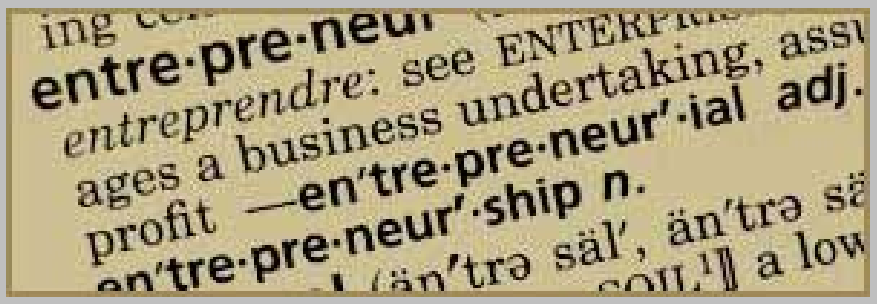
design
design
Grounding on
Technology and Design
Degree Structure
Outside-in approach

Undergraduate Curriculum

		Architecture and Sustainable Design (ASD)	Engineering Product Development (EPD)	Engineering Systems and Design (ESD)	Information Systems Technology and Design (ISTD)
PILLAR	Terms 4 to 8	Capstone Integrated Design Experience			
			Technical Application Electives		
		Architecture Core	Engineering Product Core	Engineering Systems Core	Information Systems Core
			Probability and Statistics		
		Entrepreneurship, Management, Social Sciences, Humanities, Arts			
FRESHMORE	Term 3	Modeling the Systems World, Engineering the Physical World, Digital World, Biology			
	Term 2	Advanced Mathematics II, Physics II, Design, World Civilizations and Texts			
	Term 1	Advanced Mathematics I, Physics I, Chemistry, World Civilizations and Texts			

Pedagogy

- Cohort-based learning communities
- Project-based and hands-on learning throughout the curriculum
- Learning objectives and measurable outcomes for ALL courses
- Lecturettes and videos
- OpenCourseWare
- Khan Academy type material and learning

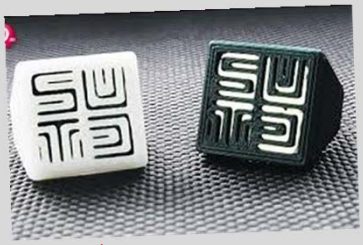


STUDENT-INVOLVED ACTIVITIES

Library Extension Project

SUTD students developed the design concept for the Chinese New Year light-up for 3 years

Chinese New Year Horse



Easy Ring

Leveraged Freedom Wheelchair

SUTD's maturing clusters and emerging centres

SUTD-MIT INTERNATIONAL DESIGN CENTRE (IDC)

LEE KUAN YEW CENTRE FOR INNOVATIVE CITIES

Materiality Design

Digital Design & Manufacturing

Health and Medical Engineering

Big Data

Robotics

Smart Energy

iTrust Center for Research in Cyber Security

SUTD Game Lab

Temasek Labs @SUTD

SUTD-MIT INTERNATIONAL DESIGN CENTRE (IDC)

Undertake the impossible, Design the unexpected

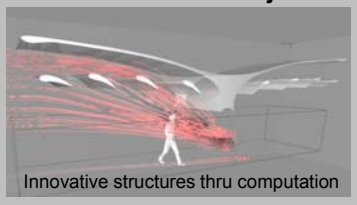
SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

Mission

The IDC intends to become the world's premier scholarly hub for technologically intensive design research and practice.

267 persons engaged in the IDC
115 research projects
50 leveraged grants
410 conference publications/presentations
232 book/journal publications
63 accolades
24 IP

Project Snapshots


Innovative structures thru computation


MICA cube

Design Grand Challenges →

- Sustainable Built Environment
- Design with the Developing World
- ICT-enabled Devices for Better Living

Design Research Thrusts →

- Experimental Design
- Design Computation
- Visualisation and Prototyping
- Fostering Creativity
- Decision Making
- Global Collaboration


Pavilion: Gridshell structure


Housing connection and campus center

Campus

Ready by end 2014

Progress

Curriculum
MIT, ZJU, SMU
Freshmore Courses
Pillars
Postgraduate Programs

Research
IDC
LKY CIC
iTRUST
Game Lab
Temasek Labs
Faculty Driven Research

Human Resources
Top Flight Faculty (135)
Top Flight Students (921)
MIT Collaborators (>100)

Culture
Cohort Based Learning
Entrepreneurship
Experimentation
Autonomy

Infrastructure
Interim Campus
Permanent Campus
Equipment and Labs
Financial resources
Systems

SUTD Needs the Help and Support of the MOT Community

SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

Established in collaboration with MIT

Thank You