



Innovation for/in India

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TATA CENTER
TECHNOLOGY + DESIGN

MIT Massachusetts
Institute of
Technology

Nevan C. Hanumara

Vivre, ce n'est pas copier, c'est créer!
Life, it's not for copying, it's for creating!

John Dal Piaz, Président CGT
Designer SS Normandie,
Winner Blue Riband 1935

Cie Gle
TRANSATLANTIQUE



He who works with his hands
is a **laborer**.

He who works with his hands
and his head
is a **craftsman**.

He who works with his hands
and his head
and his heart
is an **artist**!



Francis de Assisi

Nevan C. Hanumara

Ideation + Execution = Innovation





Nevan C. Hanumara



poor
customer

low cost
value

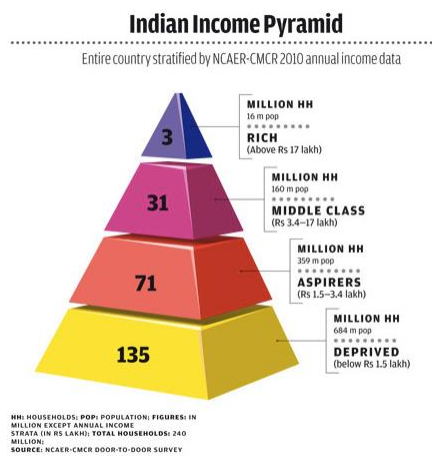
simple
sophisticated

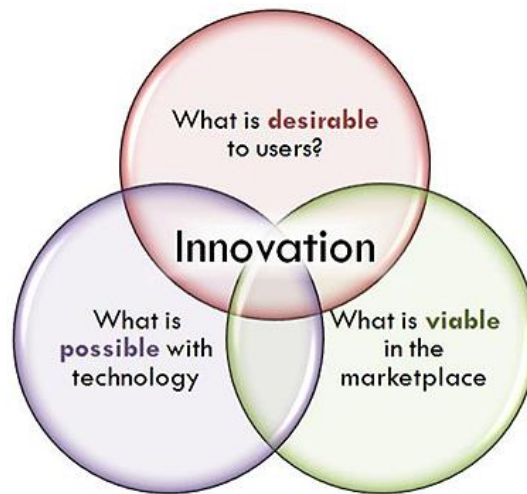
problem
opportunity

defeatured
performance

Nevan C. Hanumanra

And this is your opportunity!





Nevan C. Hanuman



Customers	Strategies	Biz model
Needs	Designs	Manufacturing
FRs	Prototype	Distribution
Specs	Results	Service



MIT Tata Center Mission

The MIT Tata Center for Technology & Design is creating sustainable solutions & developing expertise to improve the quality of life in resource-constrained communities, with an initial focus on India.



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- Established 2012 @MIT, Cambridge, MA by [Tata Trusts](#)
- Currently 58 Graduate student fellows
- 40% female Fellows
- 45 Faculty from across the Institute
- 40+ current projects at 20+ sites in India & abroad
- Supported by 10 postdocs, 3+ staff, 2 visiting scientists
- Sister [Center](#) launched at IIT Bombay in 2014



Agriculture



Energy



Health



Housing / Infrastructure



Water

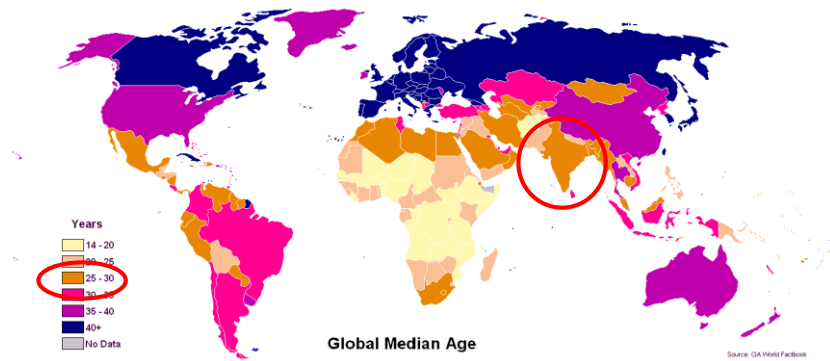
MIT & IITB Tata Fellows



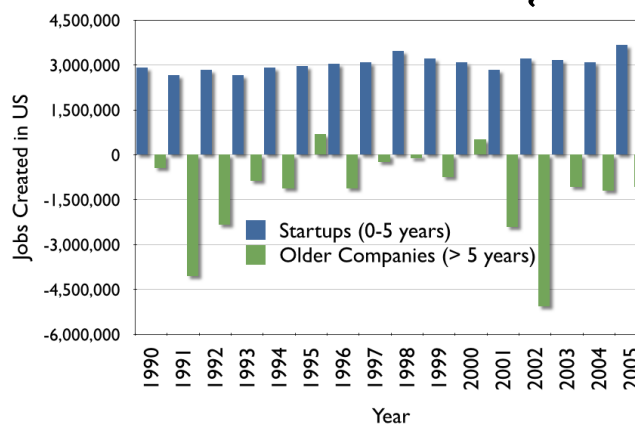
- Started in 2014
- 18 graduate students
- 28 faculty, 10 staff
- Developing a new curriculum
- Faculty and student visits
- Designing fabrication space
- Launching first MIT – IITB collaborative project



India needs you... you are India!



Net Jobs Created by Startups



Startups created almost all of net new jobs
Older companies have been negative job creators

Source: "Where will jobs come from", Kauffman Foundation



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Gillette

2002

- Indian men are furry AND take pride in shaving
- Functional Requirements:
 1. Effectively shave thick, high density hair
 2. Suitable for non-daily use
 3. Low price point
- Solution – “Improved Vector”
 - Rebranded a discontinued 1977 product
 - Added “push bar” to clear clogged hair
 - Tested with MIT’s Indian students
 - Feedback - Loved it!
- Massive failure India!
- Razor won’t clear without running water



2010 Know thy customer

- 20 person team sent to India
- 1000 consumers, 3000 hours
- Actual shaving conditions:
 - Crowded, no electricity
 - Early AM while still dark
 - Sitting on floor
 - 1 cup water, often no mirror
- 30 min to shave (vs. 5 - 7 in US)
- Cutting a real risk
- Functional Requirements
 1. Affordability
 2. Safety
 3. Ease of use



Closeness unimportant

Success!

- Launched October 2010
- Design:
 - 1 blade
 - Safety comb
 - Pivoting head (can't be reversed)
 - Light, full size, multiple grip handle
 - Hanging hole
- 4 parts vs. 25 in Mach3
- Sold through local kiranas
- 21 INR (35¢), 7 INR (12¢) refill
- Consumers 6:1 preference over DE
- 50% market share



Example Research Projects



Prosthetic knees & feet



Improving non 24 water supplies



Village-scale microgrids



Waste to building materials



Waste management

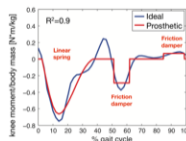
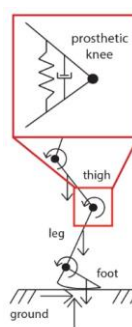


Agricultural technology

Prosthetics with JAIPURFOOT



MIT MechE Video



Village scale, peer to peer micro grids

uLink

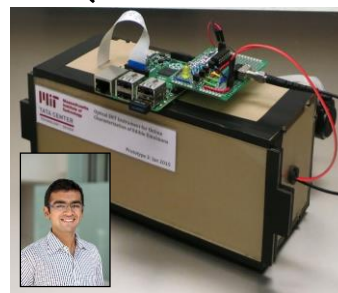
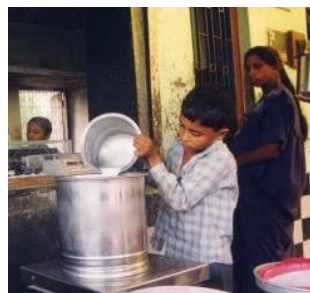
- Power management units installed at household level
- Nodes interact to autonomously manage grid
- Power conversions for specific loads
- Test installations Jan. 2015



In the lab and in the field



Characterization of Raw Milk



Problem:

- Began as milk adulteration sensor
- Inadequate quality assessment of raw milk prior to pooling
- Human intervention in milk handling
- Lack of control over hygiene

Solution:

- Instrument for online Fat, Protein and SNF measurement
- Resistant to inflated measurement due to dilution with water or processed milk
- Field-applicable in terms of cost, maintenance and training

Getting pumped in India



- Small ~1 acre farmers dependent on year round crops
- Irrigation is essential in Eastern India
- Diesel pumps are expensive and oversized
- No optimized solar pump – controller system
- Complete ground up pump design
- 0.8 lps flow, 10 m of head, 290 watts, $\eta = 35\%$ vs. 17% typical

Lessons learned in India

India represents a vast customer base that
 desires low cost per use
 but high performance
 tailored solutions
 that are durable
 and easy to maintain.



*Thank
You*

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