Empathetic innovations for closing the social & technological gap:

Honey Bee Network Model

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Anilg.sristi.org

Honey Bee network
(1987-88)

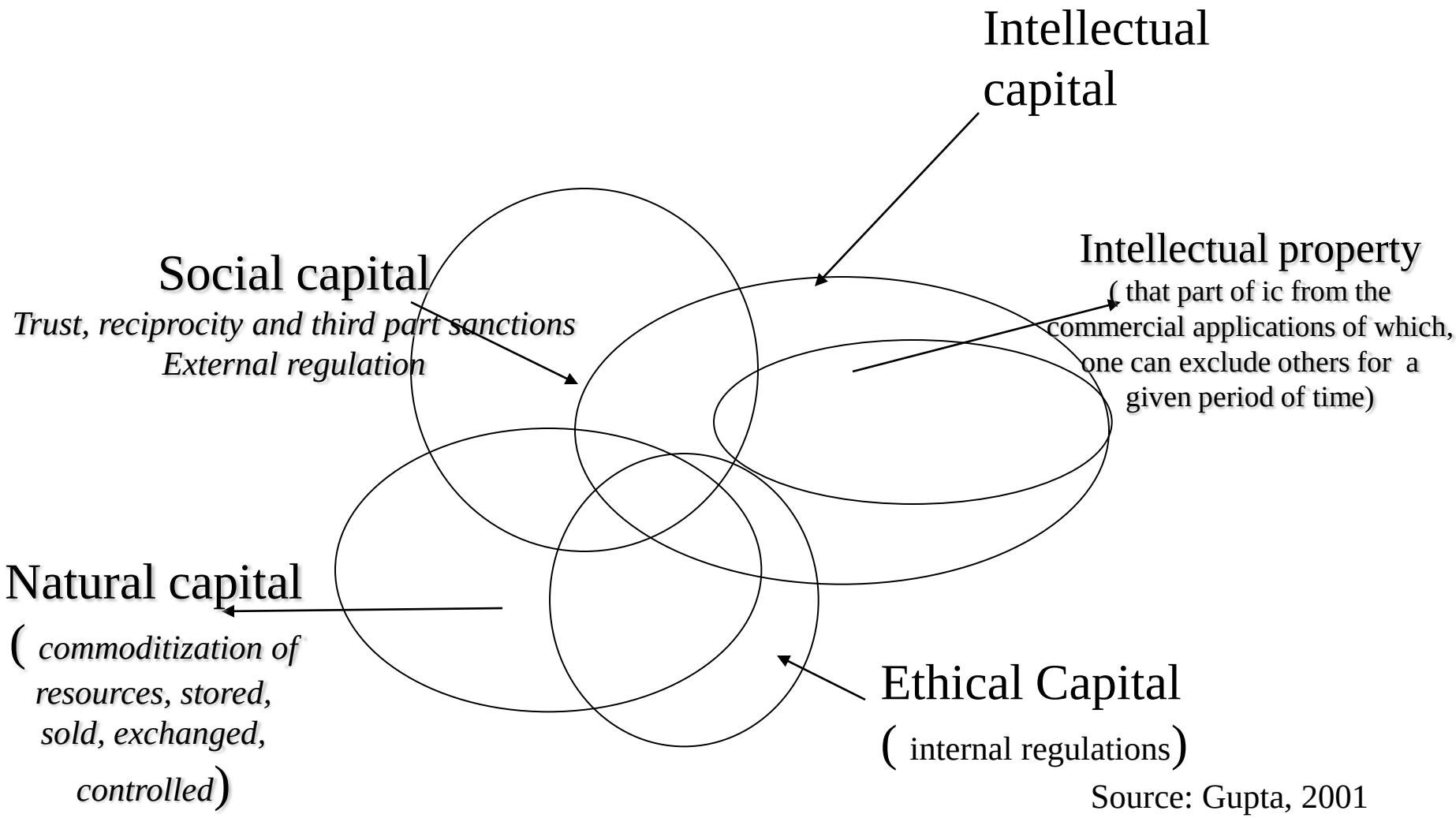
A nameless, faceless innovator or traditional knowledge holder comes in contact with the Network and gets the identity

Towards blending natural, social, ethical and intellectual capital

Sowing the seeds of *samevdana*

Towards empathetic innovations

Honey Bee



Source: Gupta, 2001

Key technological challenges for improving productivity
And improving quality of life:

a) Almost all small farm machinery innovations have no feedback control system

b) Almost all mobile phones have no add-ons to either sense water or food quality, or purify it by UV LED or any other nano tech injections, even diagnostics,

a) Almost all the sensor based innovations by children point out their impatience with inertia
b) Technology students and faculty need to partner with informal sector
c) Heuristics underlying Grassroots innovations can help in humanizing technology design process

Institutional environment for triggering

Making strategic breakthroughs

Domain characteristics

Technological platforms	Known	Unknown
Known	incremental innovations, adaptive trials, user-led modifications. , **incubation**	R & D with external experts, new actors and new arrangements
Unknown	Product Development, amplify the **form, features and functions**	Paradigmatic disruption, discontinuity and non-parameteric approaches , **sanctuary model**

d) conventional incubation model is obsolete, shift to *sanctuary model* for providing support to start ups, in incubator, *chaos is outside, order inside*, in sanctuary, it is opposite, *chaos is inside and order outside*,

e) Burden consumer with non-essential functionalities thereby reducing gap between need (less) and want (more)

f) Bypass early stage proof-of-conceot ideas for risk funding (ratio of unsupported-ideas to supported ones is too large)

g) Impact on Nature figures as a residual category rather than as a basic design criteria –circular economhy

Authenticity, accountability, accessibility and aggregability : towards network economy

What are stairs used for:
horizontal bonding between formal and informal sector, science and spaces

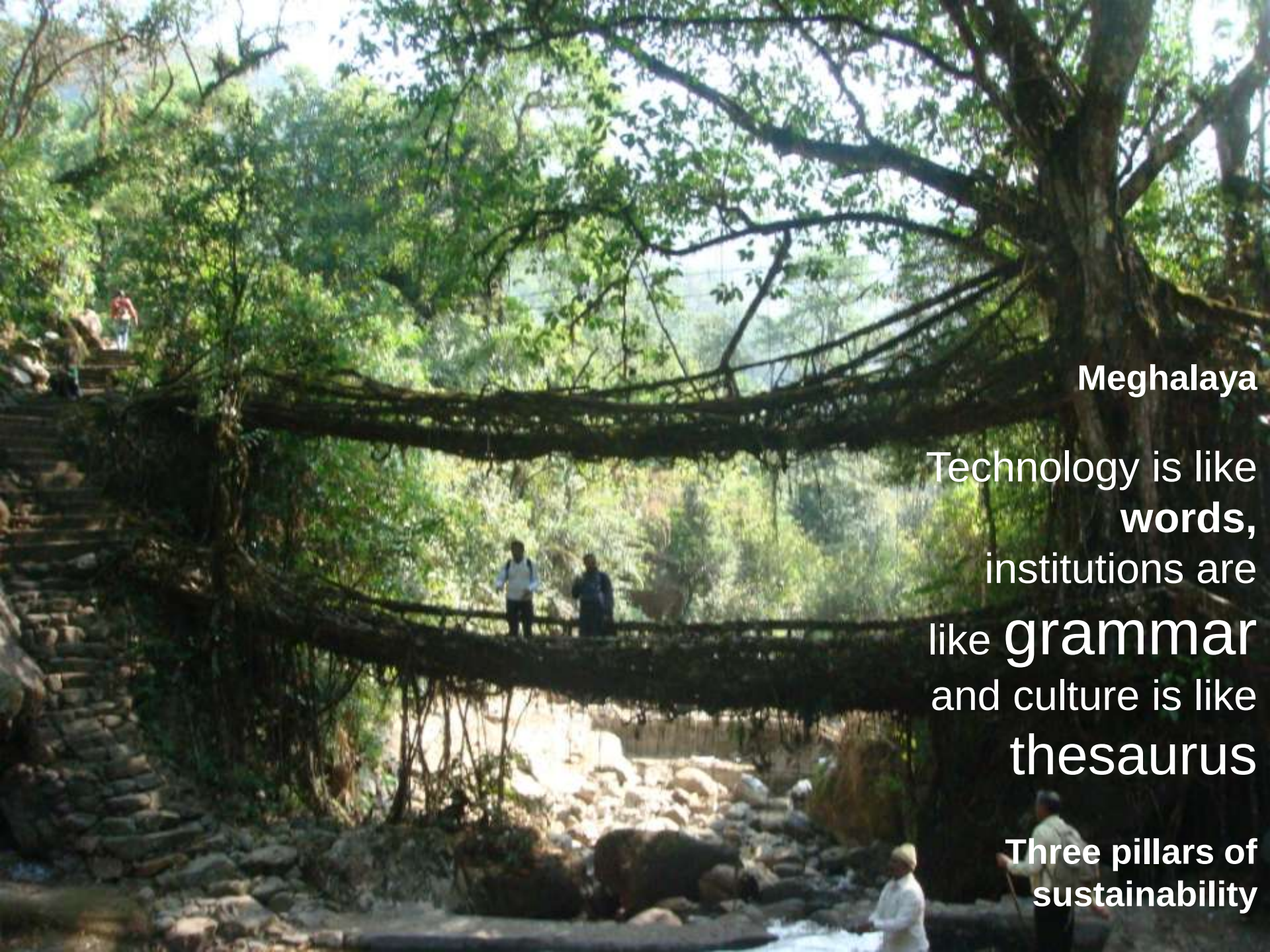
Dimensions of Inclusion

BYPASSED

- Spaces
- Sectors
- Seasons: stable to fluctuating
- Social segments
- Skills, mental models and knowledge

Inclusive Frugal Innovation

CREATING open source PUBLIC STANDARDS OF EXCELLENCE



Meghalaya

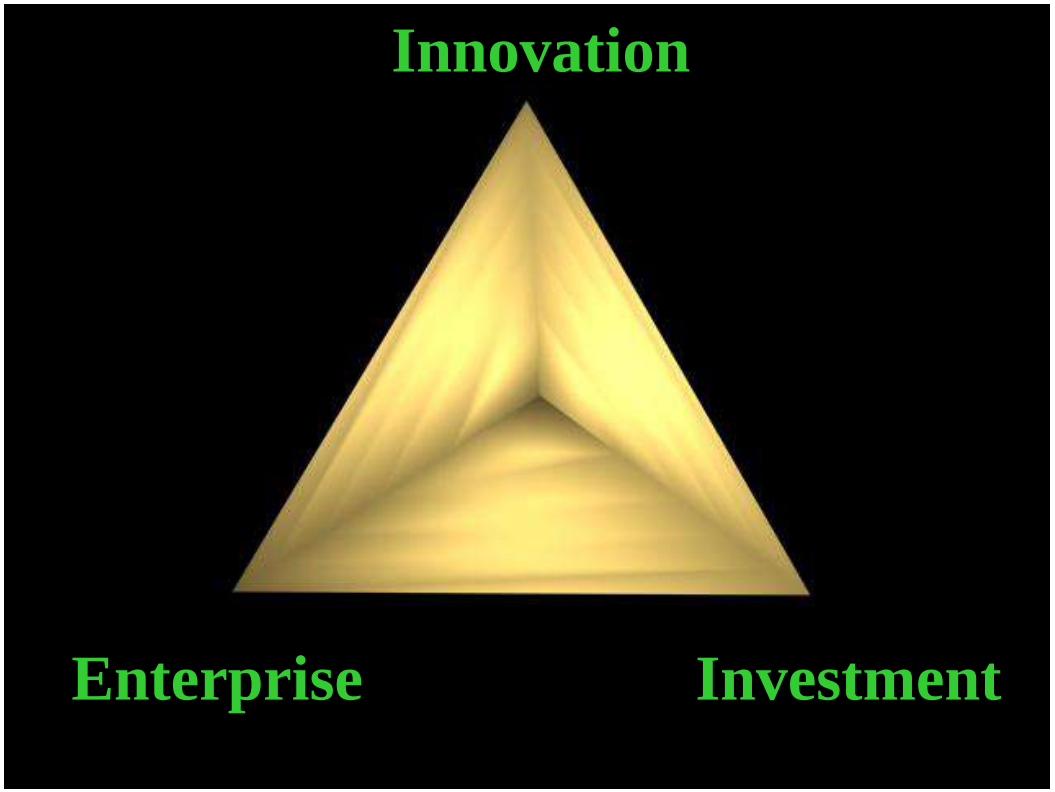
Technology is like **words,** institutions are like grammar and culture is like thesaurus

Three pillars of sustainability

GOLDEN TRIANGLE for rewarding CREATIVITY

Leadership is to take note of *ex ante* and *ex poste* transaction costs and deal with them upfront,

If not these are transferred to the weaker partner



Information/Knowledge/Wisdom

Innovation Playground

Large heart, big mind,

Dil bada dimaag bada

	Inside out High	Inside out Low
Outside in High	DBDB	Sponge
Outside in Low	Pollinator	ostrich

Knowledge asymmetry in the Network

Synaptic Interaction	Low	High
Low	**Insular**	**Island**
High	**Peer learning**	**Inclusive Knowledge System**

Emerging model of frugal and empathetic innovations


Minds that meander

Posture correcting chair/Sensor

Kulsoom Rizvi, 5, Muzaffarnagar , UP & Tarun Anand, 10, Hardoi, & UP Sunvi Agarwal, 10, Gurgaon, Haryana

If a person is sitting on the chair in a wrong posture, an alarm will start ringing and not stop until the person corrects the posture. Else, a camera in computer device or TV screen will sense posture and cover the display with a message, “sit properly before u can work”

Modified walker with adjustable legs

Shalini Kumari
Bihar

Shalini's grandfather uses a walker to assist him while he walks. But she noticed that he could only use the walker comfortably while walking on a level surface. Shalini came up with the idea of the modified walker with adjustable legs. She has also thought of including a folding seat so that the user can rest for a while when required and fitted a horn and a light to it as well. NIF licensed this technology to a company recently

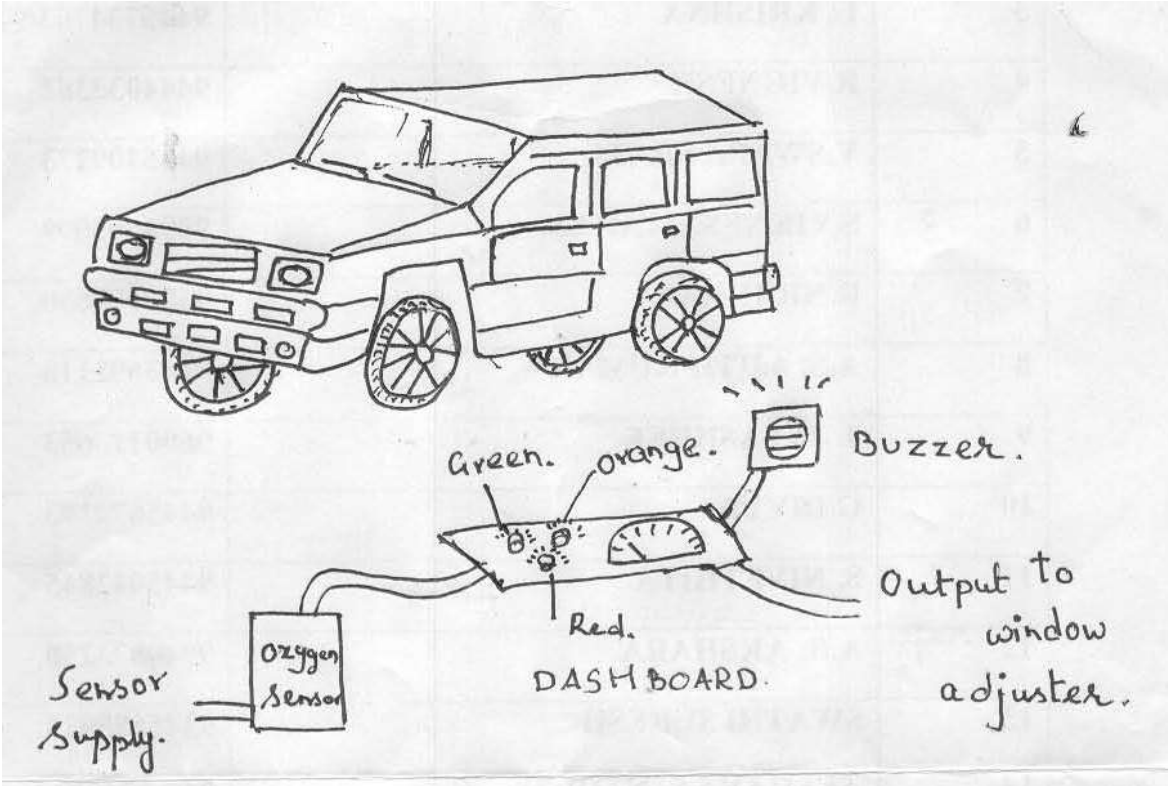
Pen to check concentration

Rudra Prasad Goswami, 11, Ranchi, Jharkhand

Sometime we get distracted while studying and loose our concentration. The idea is to have a pen with pressure sensors on the grip. Whenever the student will not concentrate the grip on his pen will loosen, indicating that he is not concentrating.

Oxygen/ carbon dioxide level indicators in car

S R Valva,12, Kalapakkam, TN, Pratyush Kumar Sahoo, 10, Orissa, Bikash Kumar Mallick, 10, Orissa



To install a sensor to detect amount of oxygen/ carbon dioxide in cars and hence open the windows when oxygen level drops to dangerously low levels or level of carbon dioxide rises

Step lock system in bus

R Santhosh 11, K Rathna, A Nivashini, J Rajasekar, 10, Tiruvarur, TN

The idea to stop bus from moving if people are standing at the steps.

Low cost Braille printer

Santosh Singh & Khushwant Rai, 12, Jalandhar, Punjab

Braille printer exists in the market but at a price range that an ordinary man cannot afford. For this they have extended the functionalities of dot matrix printer with some modification to make economical printer which cost around Rs 10000/- against the market price of about a lakh.

Preventing driving without a license/valid documents

Durgesh Kumar
Class 10, DAV HFC Barauni
Begusarai, Bihar

Ravi Ranjan
Class 8

Shiv Kumar
Class 6

Gandhi Madhya Vidyalaya, Patna

Jyoti Dhillon
Class 10, Shishu Shala School
Rewari, Haryana

Varsha Kumari
Class 10, Indra Prasad Singh
Gangstahliya Balika Gyanpith
Patna, Bihar

G Krishna Kumar
Class 12, Govt
Boys Higher
Sec School
Thiruvarur, TN

Alarmed with an ever increasing rate of accidents caused by teenage drivers and those without proper training, these children have conceived similar ideas to prevent this. The basic idea is to prevent a vehicle from being driven if the authorized license is not present, is invalid or has expired.

Mobile to mobile charging

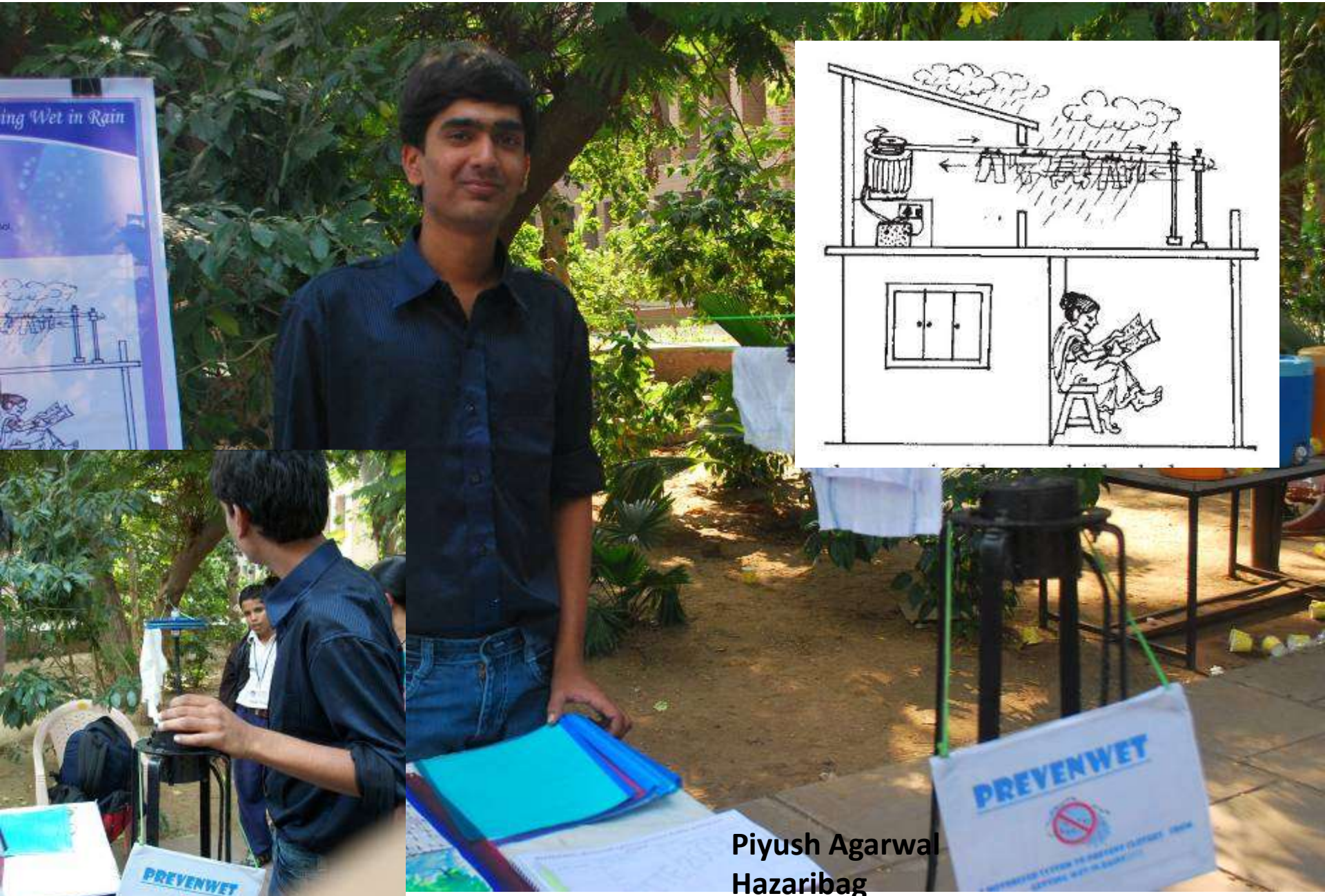
Ravi Duhan, Sanjay Raghav and Manoj Kumar
Class 9, SD SSS
Rewari, Haryana

The idea to have a system wherein charge from a mobile may be transferred to another mobile

Abdul Kaleem, Uttar Pradesh

Automatic watering system for flower pots: The device stitches on /off the water pump automatically based on feedback of moisture sensor.

Ceramic pot with heating element: It can be used to burn slowly, small mosquito coil fragments/tablets, dry *neem* leaves, *havan samagri* of the Hindus or even *lohban* used by Muslims. After burning, the ash and the residue can be easily disposed by inverting the pot. The whole process, thus, remains very clean.



Piyush Agarwal
Hazaribag
Automatic withdrawal system for clothesline during rains

Automatic Food Making Machine

watch your favorite serials on TV while the food gets cooked

Frugality has to manifest

in three dimensions

Form

Feature

Function

DHRUV: GANDHINAGAR,
A REFRIGERATOR WHICH GIVES MORE FOR LESS

Three tier system of harnessing energy : Jyoti, Arku Valley, Andhra Pradesh, India

Is Frugality

Fungible?

1) Artefactual - as a replication of solution level

2) Analogic - metaphor to inspire

3) Heuristic - as a model or principle

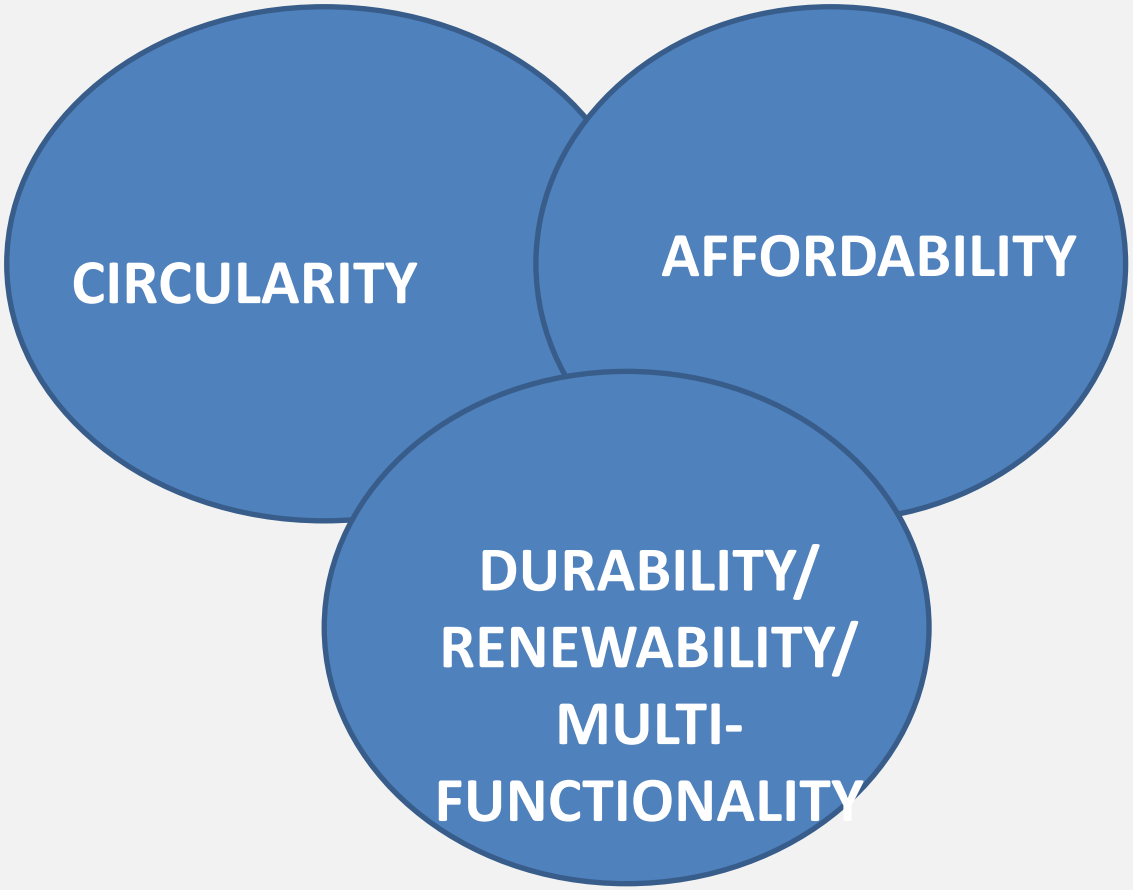
4) Gestalt - configurational level

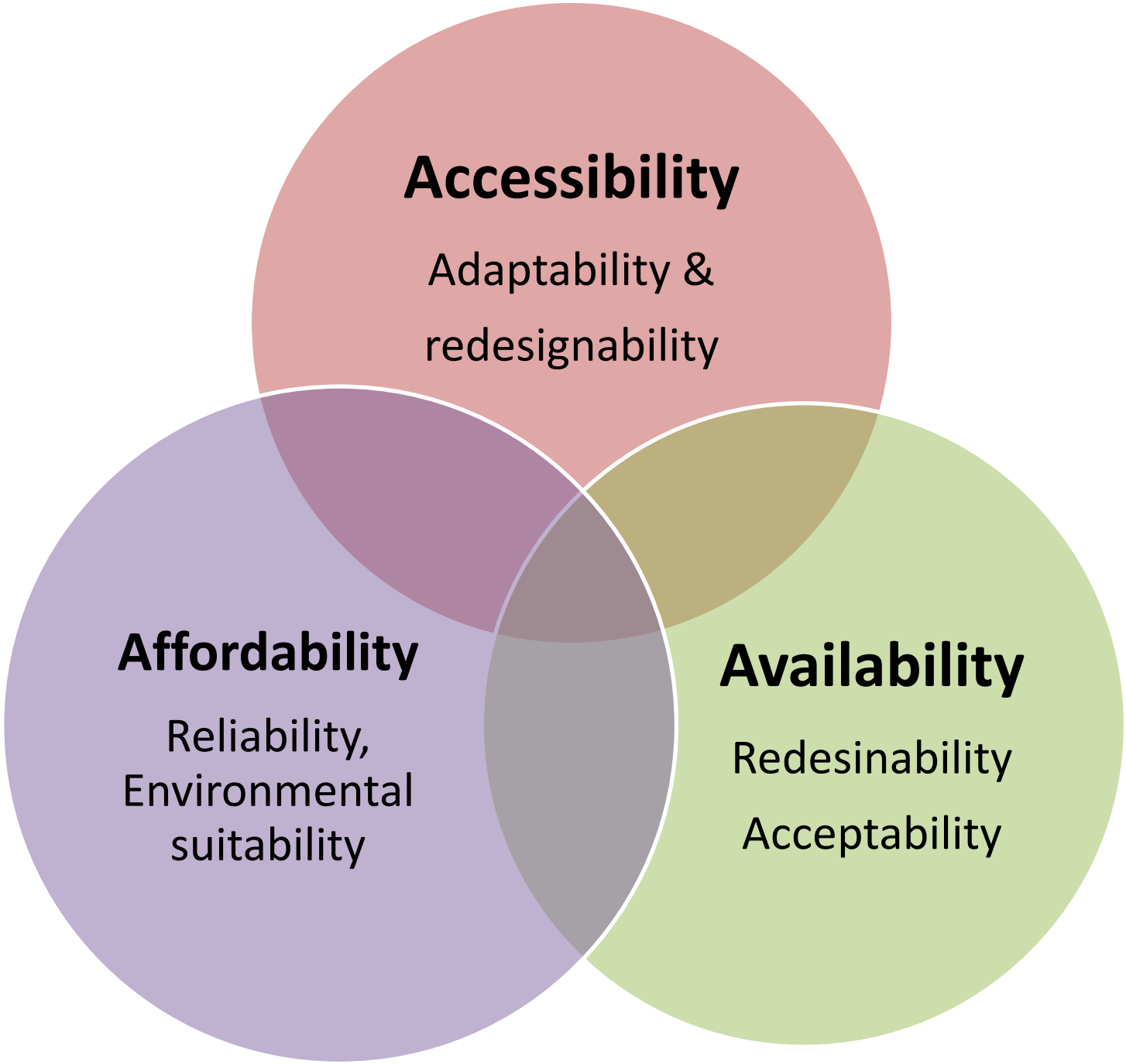
Gupta, 2012, Own compilation

Learning platforms

from concrete to abstract

Form, feature and function




Accessibility
Adaptability &
redesignability
Affordability
Reliability,
Environmental
suitability
Availability
Redesinability
Acceptability

IS FRUGALITY RELEVANT ONLY FOR POOR?

- DEMATERIALIZATION
- PLANNED RENEWABILITY
- EACH COMPONENT TO HAVE FATIGUE FACTOR IMPRINTED
- MARKET FOR USING PARTS WITH UNTAPPED ENERGY LEFT, TO DELAY ENTROPY
- SUSTAINBILITY IS THE SOUL OF FRUGALITY

Five Ps of leadership

Passion,

Purpose,

Process,

Platforms and performance

- a portal by SRISTI (sristi.org) pooling 200,000 engineering projects by 700k students from over 600 institutions
- engaging with youth to learn, share and co-create

www.techpedia.in

Bicyle Refrigerator For Rural Areas

Student/ Author : Sagar Chandrakant Gadkar, Amol Raghunath Kachare, Sanjay Shivaji Kachare, Suyog Hanmant Jadhav
Guided By : Prof. S. A. Khot
College : Padmabhushan Vasantraodada Patil Institute of technology, Budhgaon, Sangli

It is a 50 lit capacity, refrigerator which is powered by a rear wheel of bicycle. To achieve the required rpm of compressor we provide a larger pulley of dia 20 inch on rear wheel shaft through which pulley we run the compressor and achieved the required output. Steady paddling of bicycle at 14 km/hr. for 30 minutes at an ambient temperature of 35 C, brings down the temperature in box to 8 C.

Saral Parikshan - An Advancement In Cutting Edge Technology For Rural Area To Detect Vitamin B12 For Pernicious Anemia

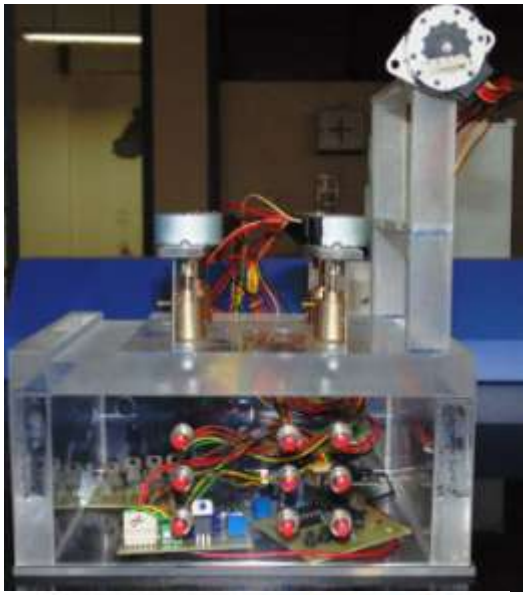
- The current innovation is the concept of simple, sensitive and inexpensive visual colorimetric detection for vitamin B12.
- Uniqueness is the visual detection of vitamin B12 using inexpensive Aptamer-conjugated gold nanoparticles (AuNPs) as signal enhancer with duration of 15 minutes in analysis.
- The biosensor's limit of detection was 100 mg/ml.
- Their method provides not only an alternative method to the current lab detection, but also a way for early screening of vitamin B12 as Yes or No, especially for clinical fields and looking for possible alternative food sources for vitamin B12 for developing countries.

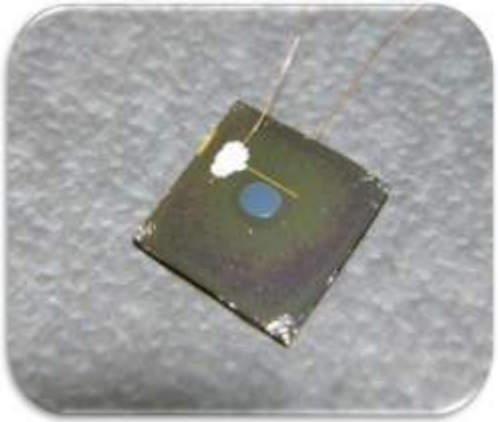
By L. Sagaya Selva Kumar and his Guide Prof. M.S. Thakur

Presented with GYTI 2013 Award

Microfluidic Immunosensor

- This device provides a reliable detection of different biomarkers, specifically cancer, and for other diseases.
- Research has been ongoing to develop diagnostic biochips that can be used to efficiently analyze least amount of sample in a short period of time.
- The available devices do not have many integrated sensors, and have issues like cross contamination, unstable temperature of the substrate/reagents, non re-usability of the microchips etc.
- The present invention relates to a lab-on-a-chip (LOC) device and provides an Electrolyte Insulator Semiconductor (EIS) based Microfluidic Immunosensor, which measures the changes in surface potential between the electrolyte (desired analyte) and the sensing insulator by a shift in capacitance-voltage (CV) curves.
- This shift is a direct representation of sensitivity of the device from which quantification of a particular disease marker (present in the sample) can be obtained.



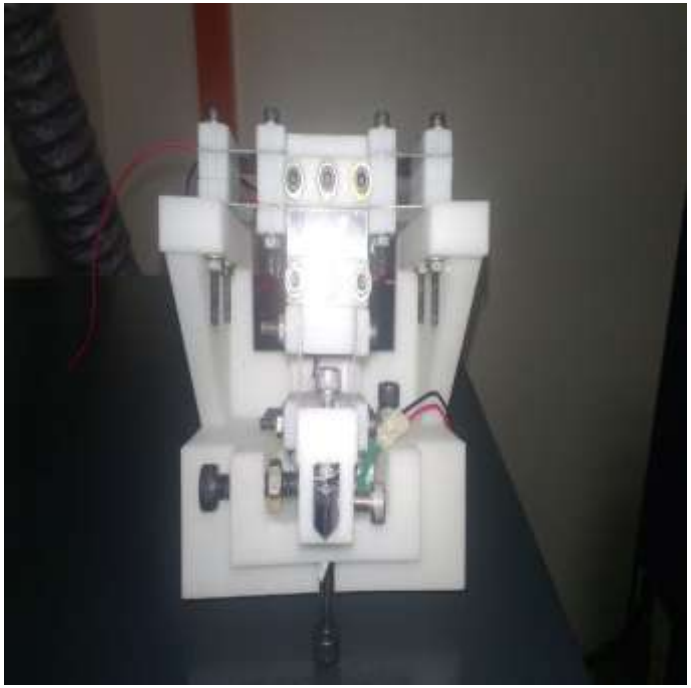


Presented with GYTI Award 2014

By Ramchander Chepyala, Satyendra Kumar, Narendra Kumar, Bhanu Prakash with their

Touchpad For Malignant Tumour Epithelial Detection And Imaging

- The system is a non-invasive and highly portable method of malignant (cancerous) tumour detection (differentiating it with benign tumours) without biopsy within a few seconds.
- Studies suggest that malignant tumour cells have less potassium ions and more sodium ions. Hence there is a difference in the conductivity/dielectric properties between cancerous and non-cancerous tumours.
- This device compares the conductivity and dielectric properties of the tumour with the normal cells and by analysing the difference in dielectric properties determines whether the tumour is cancerous or not.
- An imaging system is also proposed using a matrix of electrodes for easier visualization.

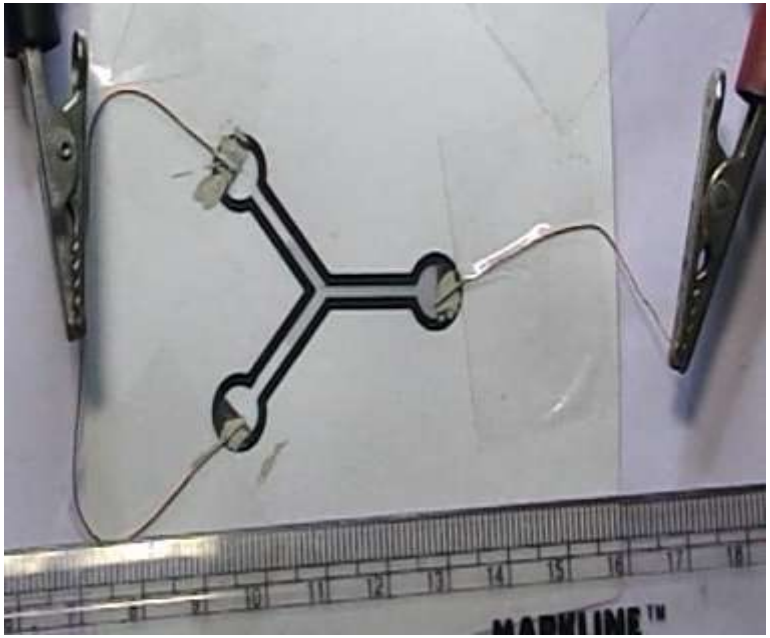


By Sritam Parashar Rout ,Sritam Parashar
Aditya Garg and Himanshu Gangwar
with the help of their guide Prof. Anoop J

Presented with GYTI Award in 2014

Paper And Pencil Micro Fluidic Device For Point-of-care Diagnostics

- Rapid Diagnostic Test (RDT) kits are not commonly available for many diseases prevalent in developing countries. Even for such kits, the test procedures can be labour and time intensive, requiring expert supervision all the time.
- The present paper-and-pencil diagnostic device is low-cost miniaturized (due to the innovative fabrication methodologies) and efficient (high throughput rate and multiplexable) device, which does not require an elaborate infrastructure and trained on-field pathologists through the implementation of colorimetric quantitative detection techniques (unlike the majority of the available RDT kits which are qualitative in nature).



By Ranabir Dey, Shantimoy Kar with th
Guide Prof. Suman Chakraborty

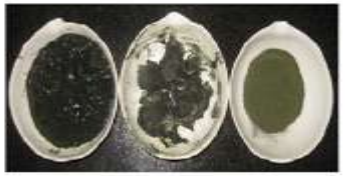
Presented with GYTI Award in 2014

Novel Algal Bioreactor For Wastewater Treatment And Biofuel Lipid Production

- A continuous bioreactor for treating wastewater with nutrient recovery and biofuel production. This technique works on bioremediation principle with appropriately chosen algal consortia.
- The algal bioreactor is based on the three phase plug flow design and is optimised to work at variable flow rates. It results in over 90 per cent of nutrient removal and almost complete pathogen removal.
- The uniqueness lies in the reactor configuration, and selection of algal species adapted to various redox environments. Additionally, the rapid harvest of the reactor by-product (valorised algal biomass) yields bio-diesel with quality fatty acids (C16-C18).

1. Water Purification

2. Biodiesel Production



3. Nutrient Recycle

By Durga Madhab Mahapatra with his g
Dr. T V Ramachandra And Dr. H N Chana

Presented with GYTI Award in 2014

Cost Effective Vegetable Chiller For Rural Small Farmers

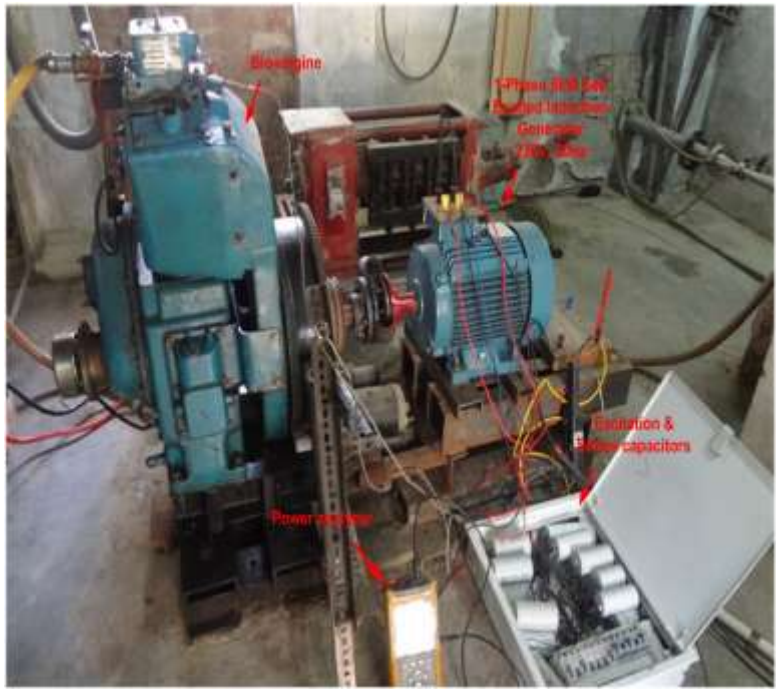
- Large cold storage facilities for storage of vegetables are out of reach and unaffordable for the small and marginal farmers.
- The chiller is a cost effective and ultra-low energy consuming storage device and consists of three units i.e. evaporative cooler, sub cooler and a food storage cabin.
- It uses Phase Change Material (PCM), which acts as an effective medium of passive cooling system, absorbing heat until it reaches its melting point and changes its phase from solid to liquid.
- The device consumes power only for charging the liquid PCM i.e. converting it back into solid state, which can be done during night times (off-peak) within 1-2 hours. Thus such food chillers can efficiently operate in regions of interrupted grid power supply as well.

By Vishnu Padmanaban ,M.ramesh Nachiappan and S.Manikandaraj with their guide Dr. Elangovan

Presented with GYTI Award in 2014

Novel Stand-alone 1-phase Ac Generator For Rural Electrification Using Renewable Energy

- Bio, Pico-hydro and wind are important renewable energy sources suited to small off-grid power applications in rural/remote areas with significant potential in India.
- For such units used by domestic/commercial consumers, single-phase supply is the prime need. Thus this project reports a first successful effort on design and development of 5kW, 50Hz, 230V, 4-pole single-phase AC Generator which is simple, rugged, cost-effective, brushless, maintenance free and user friendly like remote area power supplies used by less techno-savvy population.
- Based on the design, a prototype has been fabricated with the help of an industry and tested for suitability.



By Sandeep Vuddanti with their guid
Prof. S.S. Murthy & Prof. Bhim Singh

Presented with GYTI Award in 2013

Hydro-operated Square-bottom Paper And Jute Bag Making Machine

- This is a hydro-operated machine which performs four tasks simultaneously:-
  - Make Square bottom paper bag
  - Make jute bag
  - Generate electricity
  - Filter water.
- The machine also places a base-supporting card in the bag after producing it. The machine is fully automatic and eco-friendly. It can be easily connected to an electricity supply by attaching a 2 HP motor.

By Anirudh Thakur as a Hobby Proje

Presented with GYTI Award in 2013

Amphibious Car
The Chinese innovation by Hu Ze En

The Indian Innovation by P.S.Vinod, Kerala

Bicycle Hoe

Lao Yang, Shan dong province

Zhang Xingming, Shaanxi Province

Wang Fuhe
Miyun County, Beijing

Gopal Malhari Bhise, Ahmednagar,Maharashtra

Children's Creativity and Innovation Day
October 15


National Innovation Foundation
पाँचवाँ राष्ट्रीय तृणमूल नवप्रवर्तन
एवं विशिष्ट पारंपरिक ज्ञान पुरस्कार समारोह
5th National Grassroots Innovation and
Outstanding Traditional Knowledge Award Function
नवंबर १८-१९, २००९
November 18-19, 2009
DST
DSIR
Honey Bee Network
IIM
CSIR

Mind to market:
the case of herbavate

Herbvate: a skin ointment

- It is based on the knowledge of seven innovators from six districts Sabarkanth, Panchmahal, Dang, Mahsana, Patan and Bhavnagar of Gujarat. Herbavate exhibits remarkable properties against eczema and variety of inflammatory and infectious skin conditions.

Communities: The innovators of Herbavate: 1. Amratbhai Shankarbhai Rawal, Mehsana Gujarat. 2. Kunjubhai Kakadiyabhai Bhoya, Dang Gujarat 3. Pujabhai Dabhi, Sabarkantha, Gujarat 4. Karshanbhai Parmar, Sabarkantha Gujarat 5. Laxmanbhai Pagi, Panchmahal, Gujarat 6. Lilabhai Rawal, Patan Gujarat 7. Lakhabhai Becharbhai Khatana, Bhavnagar Gujarat

HERBAVATE

Herbal medicine for patients suffering with dermatitis and psoriasis

g2G

grassroots to global

Global GIAN – Building Global Value Chain for augmentation of Green Grassroots Innovations

Sales made

1. Coconut tree climber- USA (Florida, Massachussets, California, Hawaii etc.) Australia, Maldives, Sri Lanka, Brazil, Mexico, West Indies
2. Pomegranate deseeder-Turkey, USA
3. Garlic peeling machine-Pakistan
4. Arecanut husker- Singapore
5. Milking machine-Phillipines, **Uganda, Ethiopia**
6. Resin grading machine-Peru
7. Cassava peeling machine-**kenya**
8. Herbal growth promoters-Ghana

Product queries:		
Sl no.	**Innovation/product**	**Countires**
1	Coconut/palm tree climbing device	USA, United Kingdom, Vietnam, Australia, Sri Lanka, Mexico, Iran, West Indies
2	Entech oil expeller	USA, United Kingdom, Australia, Phillipines, Canada, Kenya, Colombia, S. Africa, Switzerland, Poland, Indonesia, Belgium
3	Garlic peeling machine	Slovenia, USA, Turkey, Peru, Singapore, Iran , Venezuela, Pakistan
4	Pomegranate deseeding machine	USA, Australia, Turkey, Venezuela, Hongkong, Israel, Netherlands, Thailand, UAE, Iran, United Kingdom
5	Cassava peeling machine	Congo, USA, Benin, Nigeria, Kenya, UAE, Uganda
6	Aaruni tilting cart	Uganda
7	Coconut defibring machine	China
8	Coconut dehusker	Mexico, New Zealand, USA, Philippines, Bangladesh
9	Lemon cutting machine	S. Africa
10	Milking machine	Bangladesh, Uganda, Ecuador
11	Palm leaf mat weaving machine	Fiji
12	Rain Gun (Chandraprabha)	Sudan
13	Tea making machine	Bangladesh,
14	Tile making machine	Bangladesh, Kenya, Rwanda, Ghana, Zambia
15	Trench digging machine	Pakistan
16	Zero head water turbine	Egypt
17	Arecanut dehusking machine	Chile

How to reward: Portfolio of Incentives for farmers' innovations

Forms of **incentives**

Target	Material	non material
Of individual	material-individual Ipr or non ipr based awards Awards R and d grants Endowments	**non-material-individual** Recognition Honour Memorial
Incentives collective	**material-collective** Trust funds Venture and incubation funds Collective awards Supp for Institution building endowments	**non-material-collective** Policy changes Pedagogic changes

SRISTI (*Society for Research and Initiatives for Sustainable Technologies and Institutions, 1993*) is a developmental voluntary organization, set up to strengthen the Honey Bee Network of grassroots innovators engaged in conserving biodiversity and developing sustainable solutions to local problems.

http://www.sristi.org *Note on SRISTI*

DIVISION CAN BE BRIDGED

FORMAL AND INFORMAL
CULTURE, TECHNOLOGY AND INSTITUTIONS

How did it happen:

The journey…..

Honey bee network , informal global social movement, started in 1987-88,

SOCIETY FOR RESEARCH AND INITIATIVES FOR SUSTAINABLE TECHNOLOGIES AND INSTITUTIONS (www.**SRISTI.org**) info@sristi.org

GRASSROOTS INNOVATION AUGMENTATION NETWORK (www**GIAN.org)**

NATIONAL INNOVATION FOUNDATION (www.**NIFindia.org**) info@nifindia.org

Anilg@sristi.org

Creativity counts

Knowledge matters

Innovations transform

Incentives inspire

(not just individual, but also collective, not just material, but also non-material)

Join the Honey Bee Network!
For rewarding indigenous creativity and innovation
www.techpedia.in, www.sristi.org, www.nif.org.in
anilgb@gmail.com