Humanitarian Engineering & Social Entrepreneurship (HESE)

Khanjan Mehta
Pennsylvania State University
World Class “Engineers” + (Social) Entrepreneurs
convergence
## Teaching
- 13-credit ECE Certificate
- **Fall semester:**
  - Sensor and Controller System Integration
  - Social Entrepreneurship
- **Spring semester:**
  - Projects in Community Service Engineering
  - Design for Developing Communities

## Research
- IJSLE: HESE
  - eplum Assessment
  - Systems Thinking
  - Cultural Anthropology
  - Social networks, trust and cellphones
  - Indigenous Knowledge Systems and Sticky Info
  - Design Space Exploration
  - Changing the Conversation

## Engagement
- Mashavu
- WishVast
- Essential Design
- iSPACES
- HESE - India
- Invention 2 Venture Conference
- Milking the Rhino: ISS
- Kochia Chronicles
- AcademIK Connections
- *K-12(Center for Science in the Schools)
Goal: Sustainable Value Creation

Technologically Appropriate
Environmentally Benign
Economically Sustainable
Socially Acceptable
the ventures
ESSENTIAL DESIGN

Renewable Energy  Solar Driers  Anaerobic Digesters
Wastewater Management  Water Filtration Systems
Briquetting Machines  Water Well Drilling Rigs
Livelihood for Former Street Youth
Mashavu: Networked Health Solutions for the Developing World

234 Students + 5 Faculty
40 Majors & Ten colleges
Healthcare Crisis: Focus Africa

Source: www.dowusa.org
Kiosk operator enters the problem and essential information for the patient. Doctor (actually nurses) respond to the data with recommendations. Kiosk operator relays the doctor's (nurse's) recommendations to the patient.
Radical Design for Context

Spirometer
Mashavu $10 Biomedical Devices

- Spirometer (Lung capacity)
- Pulse Oximeter (O₂ Saturation in Blood and Pulse)
- Blood Pressure Cuff
- Stethoscope

[Images of the devices]
MASHAVU
NETWORKED HEALTH SOLUTIONS FOR THE DEVELOPING WORLD
WishVast
Building Trust and Social Capital using Cell Phones
Beta-tested in Kenya; Pilot Testing in South Africa
Every 6 Months: 33% salary on new job
iSPACES:
Rethinking Science Education in Tanzania

Bachelors of Education (Science) Degree
Science, Systems and Entrepreneurship
Project Prerana + Mpower
ICT Solutions for Women’s Education
Affordable Technologies for Maternal Health
the big picture
Design for Developing Communities
Design for Developing Communities (1)

BIOE 401

M (2)

ED (2)

TZ (2)

IN (2)

W (2)
Design for Developing Communities

Arrows point from BIOE 401 to M, ED, TZ, W, and IN.

M (2)
ED (2)
TZ (2)
IN (2)
W (2)

BIOE 401
Design for Developing Communities

Industry Experts

BIOE 401
Design for Developing Communities

Industry Experts

BIOE 401

M (2)

ED (2)

TZ (2)

W (2)

IN (2)

(1)
Design for Developing Communities

BIOE 401

Industry Experts

M (2)
ED (2)
TZ (2)
W (2)
IN (2)
Design for Developing Communities (1)

Industry Experts

BIOE 401

ED 509

Ind Study

ENGL 202C

ME 440W

M (2)

ED (2)

TZ (2)

W (2)

IN (2)
Numerous concepts and disciplines
Several countries and cultures
Many forms of engagement
One goal...
World class engineers and entrepreneurial global citizens to build a freer, fairer, friendlier and more sustainable planet

Out of Many, One...

... E Pluribus Unum...

... eplum.
Fieldwork: Real; Rigorous; Intense
HESE Facts

• ~500 students engaged in 2010
• eplum model: 10 classes; 50 majors; 10 colleges
• Funding (5 years): 500K grants + 75K Eqpmnt
• Larger grants
  – 200K: Creative Campus Grant, Doris Duke Foundation
  – NSF STEP
• Active collaborations across MOST colleges
Sustaining & Scaling: Program/Ventures

Innovative Partnerships

National Instruments

FirstMark Capital

Johnson & Johnson

Alexander Varghese
United Nations International Development Organization (UNIDO)
Sustainability: Program

Design for Developing Communities (1)

- M (2)
- ED (2)
- TZ (2)
- W (2)
- IN (2)

Industry Experts

BIOE 401

ED 509

Ind Study

ENGL 202C

ME 440W
Transferability: Program

• Developing Program is an Organic Process

• Program Models, Pedagogies, Logistics, Mechanics, Methodologies are published

• Several resources are available online
  – Design for Developing Communities Seminars
  – AcademIK Connections Video Series
  – Milking the Rhino Showcase Entries
  – “How-to” papers on various topics
  – Catalogued HESE resource portal
Impact: Research

Applied Science, Designs, Methodologies, Curricular Models

Lessons Learned & Resources

22P; 1R; 7M; 11D
Impact: Real Value + Capacity Building

briody

BLUETOFE

BUZBY networks™

MASHAVU

OLOSHO-OIBOR ENERGY CENTER for Business Promotion

Managed by
Ewangan-O-Olosho-Oibor CBO

BUSINESS SERVICES

- LED Lamp Assembly
- Charging LED Lamps,
- Mobile phones, car batteries.
- Computer Training / Internet / Email
- Posho Mill
- Soap Making

Renewable Energy (Wind, Solar Hybrid) Powering,
Oloshoibor Primary School and Health center

Kochia Development Group
C.B.O.

ACTIVITIES
1. KENYA HYBRID POWER PROJECT
   ajoint PennstatE, Bowling Green,
   University of Nairobi and Kochia Development Group
2. Vegetable Project "Horticulture"
   Home based care HIV/AIDS Control
Transferring Programs
Impact: Partnerships
Impact: Education

Core Team
• Global awareness, social entrepreneurship
• Self-reported multidisciplinary teamwork

eplum Classes
Global awareness; Teamwork

All Classes
Subject matter knowledge
Impact: Education

Humility; Life Skills; Innovation
Making universities and engineering schools exciting, creative, adventurous, rigorous, demanding, and empowering environments is more important than specifying curricular details.

Charles Vest
President, NAE
President Emeritus, MIT
Mashavu

Name: MOUREM MIKAMO

Pulse: 118
Temp: 98.9°F
BP:
Weight: