What is Mobile Studio Lab?

Dr. Charles Kim
Mobile Lab
-A new tool for EE/CpE Students
Conventional Lab

- Lab Space
- Lab Equipment
- Space/Room Restriction
- Contents
  - Seldom taught by the same professor of the co-required lecture course.
  - Contents of two are seldom matched.
Pedagogy of Mobile Lab

- "Tell me, and I will forget. Show me, and I may remember. Involve me, and I will understand." - Confucius, 450BC

- Experiential Learning
  - Experience as the source of learning and development
  - dramatic impact on the design and development of lifelong learning models
  - explores the cyclical pattern of all learning from **Experience** through **Reflection** and **Conceptualizing** to **Action** and on to further Experience.

- “Bringing Lab to Classroom”
  - Lecture-Lab Hybrid Class
  - Lecture is augmented by the active experimentation
  - Lab is augmented by the verification of theory-concept
4 Quadrants of Experiential Learning

- Mobil Lab Pedagogy:
  - Experiential Learning Space
  - Space for Instant transfer and gain of convergent knowledge from Abstract Conceptualization (Lecture - Theory) into Active Experimentation (LAB - Verification) so that it becomes a concrete experience for further reflective observation
  - Lecture-Lab Hybrid Class
Mobile Lab Components

- First Generation (until 2005)
- Second Generation (2006)
Advantages of Mobile Lab

• “Mobile” lab
  – Any place (with PC, IO Board, and “MSD”)
  – No space limitation
  – No access limitation

• “Lab in lecture” and “Lecture in lab”
  – Bring in the “lab” into classroom
  – Experiential Learning and Convergent Knowledge

• Good candidate courses
  – Electrical Circuit
  – Electronics
  – Digital Systems
  – Signal Processing
  – Etc
Some Background
How we got here?

- RPI
  - Dr. Don Millard
  - Director, Academy of Electronic Media, RPI
  - Pilot Program in Circuit Theory in Fall 2004
  - Mobile technology, interactive software, laptop/tablet PC
  - “anytime anywhere”
  - Combination of lecture and lab
  - Interface Hardware and “scope” software integrate:
    - Scope, multimeter, and function generator
    - In to a PC to become a mobile laboratory instrumentation suite
Background
-continued

• HU
  – Fall 2003: RPI-HU co-operation initiated
  – Fall 2004: Drs. Millard & Kim first used the first-generation Mobile Lab in Network analysis II (Bass and Treble control)
  – Spring 2005: Drs. Millard & Kim used the first-generation Mobile Lab in Network Analysis I (RC circuit)
  – Spring/Summer 2005: HP grant of “mobile studio development”
    • 21 HP laptops
  – RPI Supports
    • Full Software including “scope”
    • 20 Breadboards with Interface
• HU
  – Fall 2006: Courses that used second-generation Mobile Lab
    • EECE 416 - Microprocessors and Microcomputer
    • EECE 307 - Electronics I
  – Fall 2006: Lockheed Martin Grant for more TabletPCs
  – Spring 2007: Courses using Mobile Lab
    • EECE 417 - Computer Architecture (TabletPC only)
    • EECE 304 - Emag (Tablet PC only)
  – Student Surveys
    • Rave View
    • Questions still remained - learning actually occurred?
  – HU Mobile Lab Web Site:
    http://www.hirstbrook.com/MSD.html
HU Mobile Lab
- Components

- Software
  - Mobile Lab Desktop v.2

- Hardware
  - PC or Laptop or TabletPC on Windows XP
  - IOBoard
IOBoard Functionality
Equipment and Probe/Connector Substitution
In other words – 4 pieces of equipment inside the IOBoard!!
Mobile Studio Desktop Functionality

- Oscilloscope
- Analog I/O
- Digital I/O
- Function Generator
- Spectrum Analyzer
Scope Function
Scope and Function Gen Functions
Scope & Function Gen with Cursor Option
Scope & Function Gen with Measurement Option
Scope function with Line Width Selection
Theory - Simulation - Experiment all at once
Gallery of Mobile Lab in action
Continued-
What’s Coming

• IO Board Connectivity (terminal) Improvement
• More TabletPCs and IO Boards
• More Course Adoptions
• Goal is to lend every student a TabletPC and IO Board every semester