

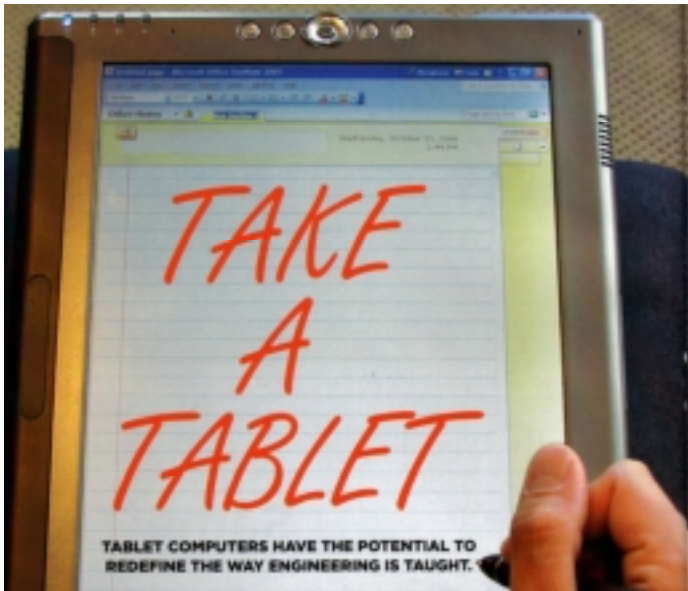
What is Mobile Studio Lab?

WWW.MWFTR.COM

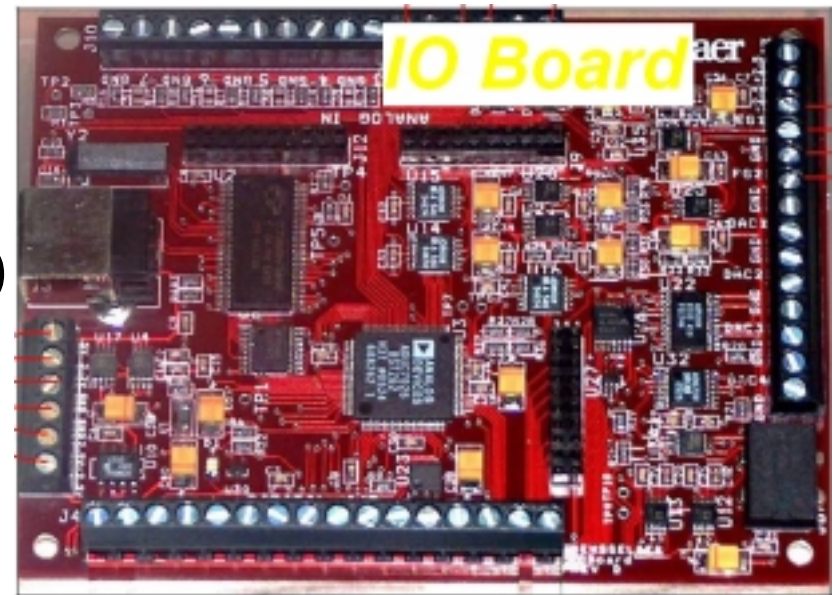
Dr. Charles Kim

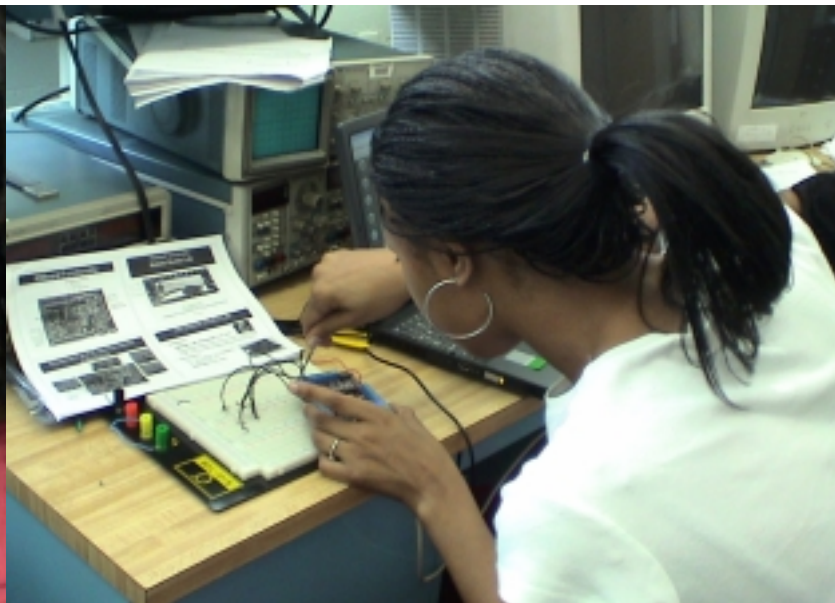
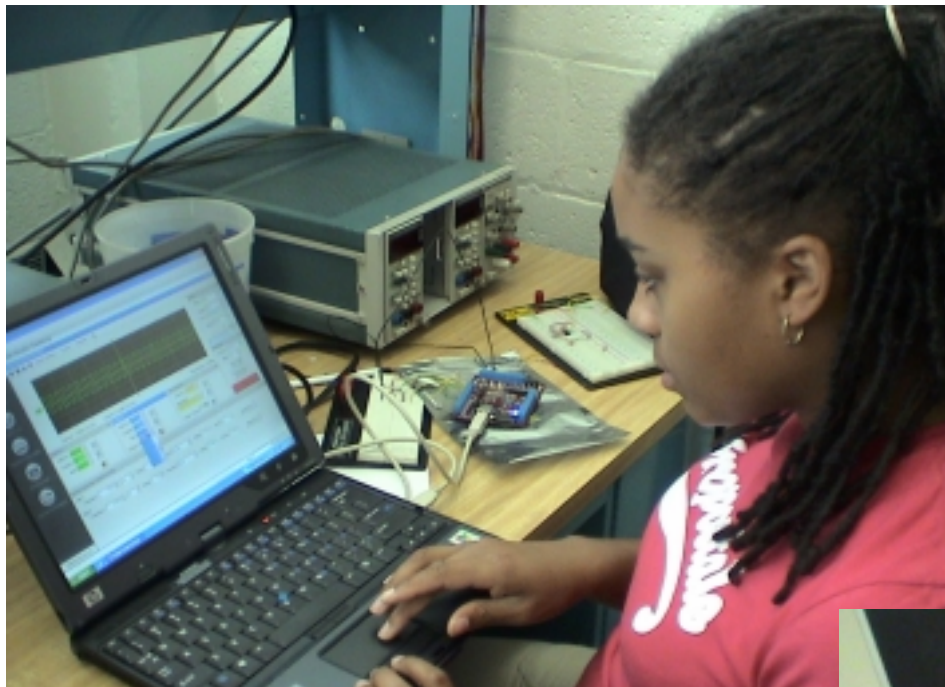
Mobile Lab

-A new tool for EE/CpE Students



AND





Conventional Lab

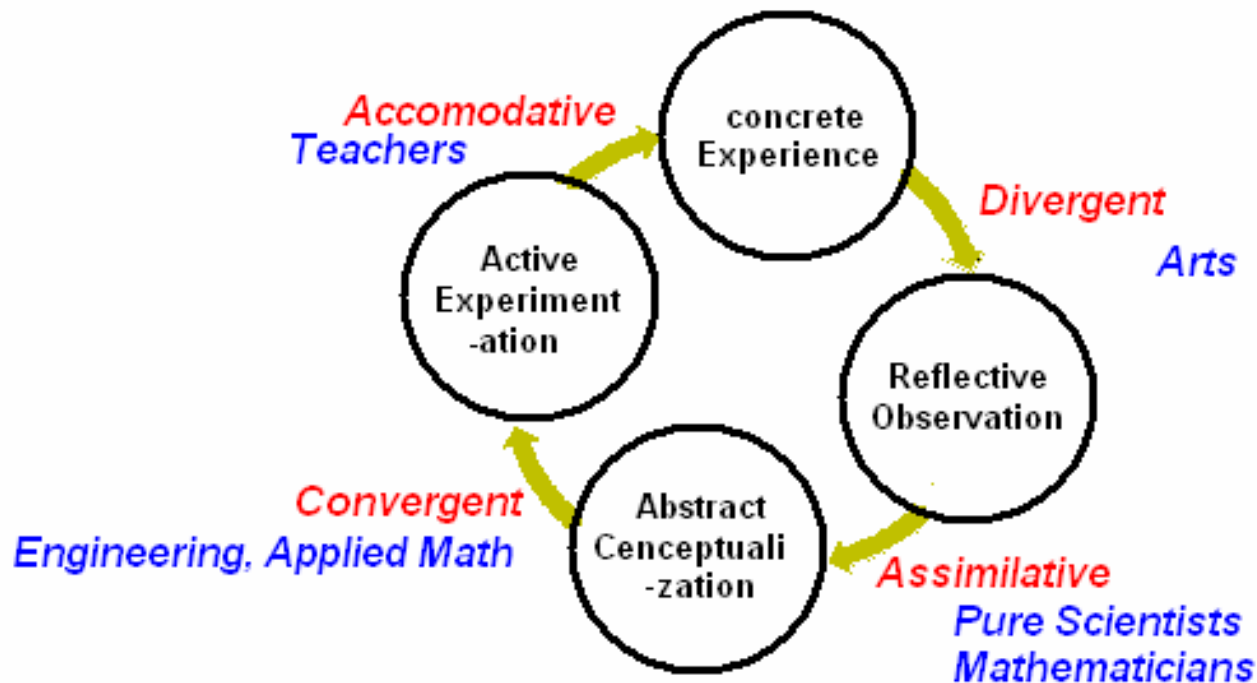
- Lab Space
- Lab Equipment
- Space/Room Restriction
- Contents
 - Seldom taught by the same professor of the co-required lecture course.
 - Contents of two are seldom matched.



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

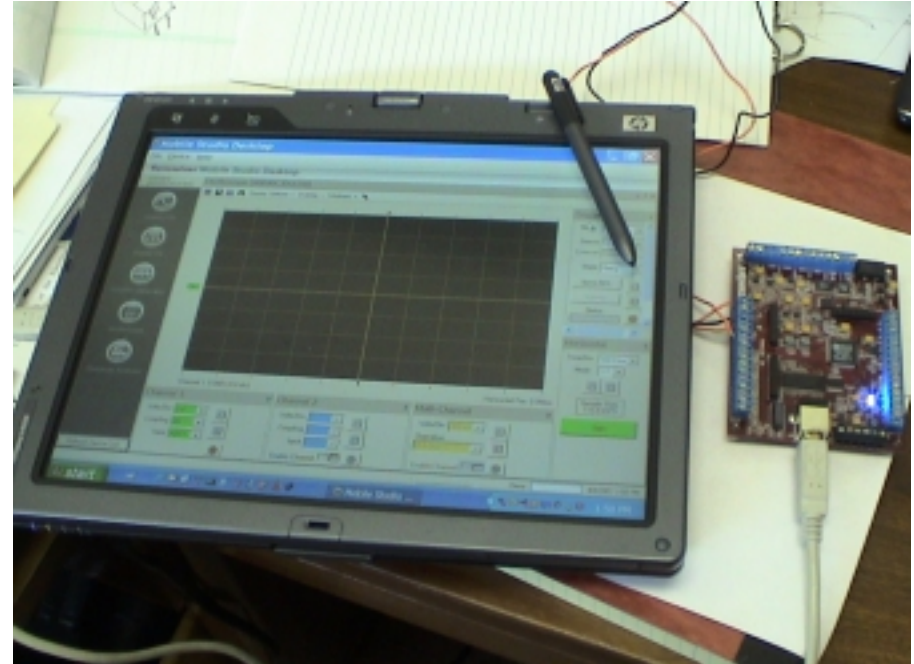
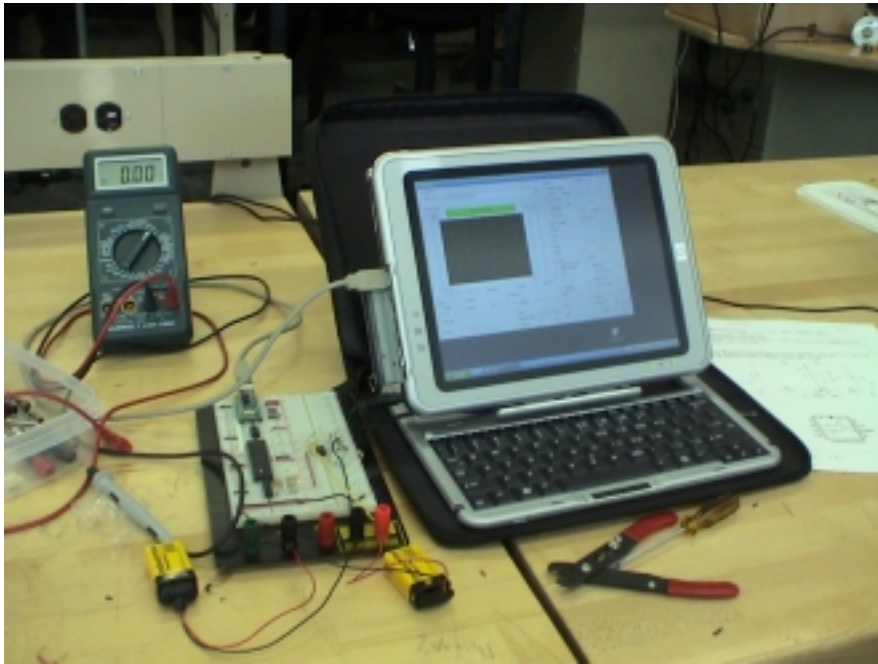
4 Quadrants of Experiential Learning



- 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)



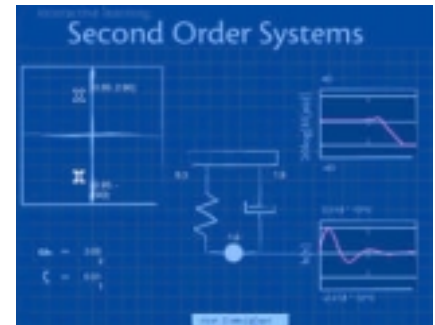
Advantages of Mobile Lab

- “ 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

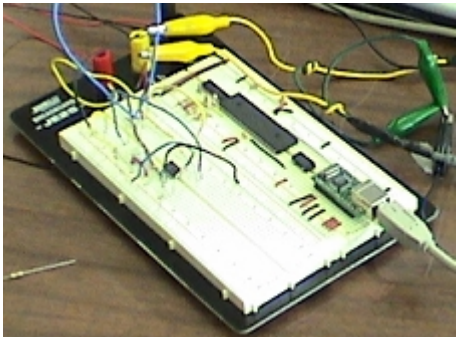


Background

-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



Background

-continued

- 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>

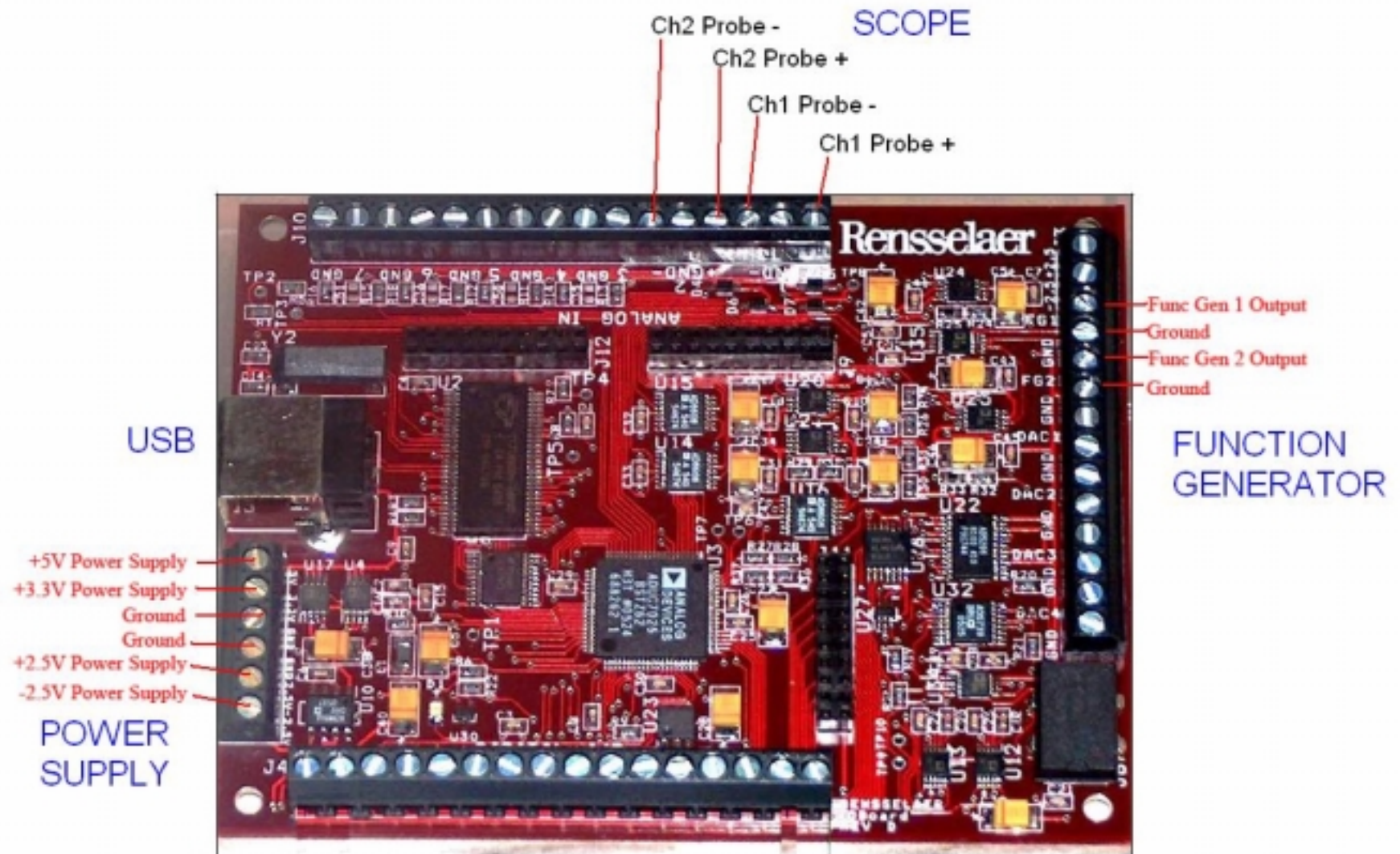
HU Mobile Lab -Components



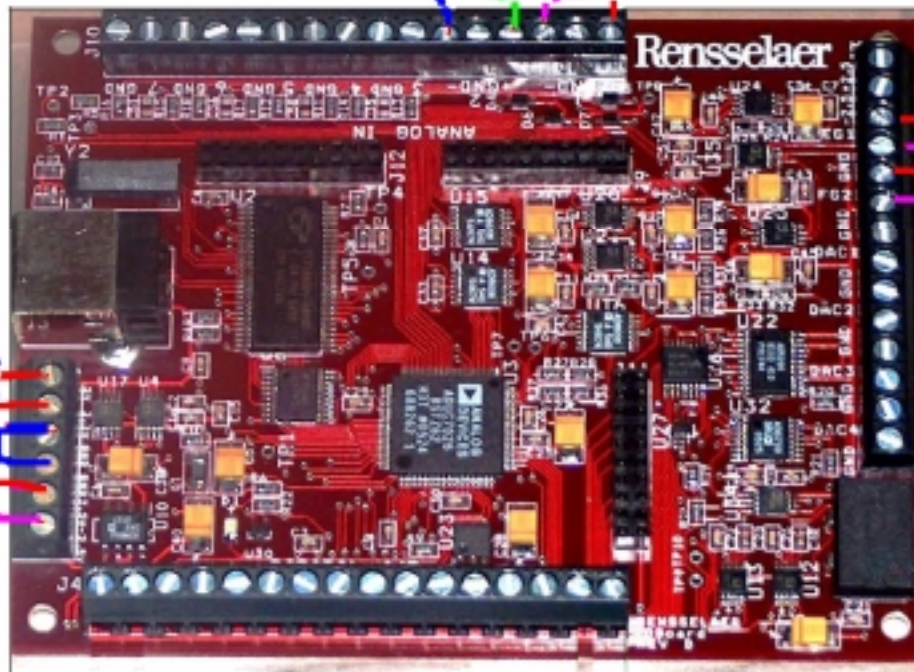
- Software
 - *Mobile Lab Desktop v.2*
- Hardware
 - PC or Laptop or TabletPC on Windows XP
 - *IOBoard*



IOBoard Functionality

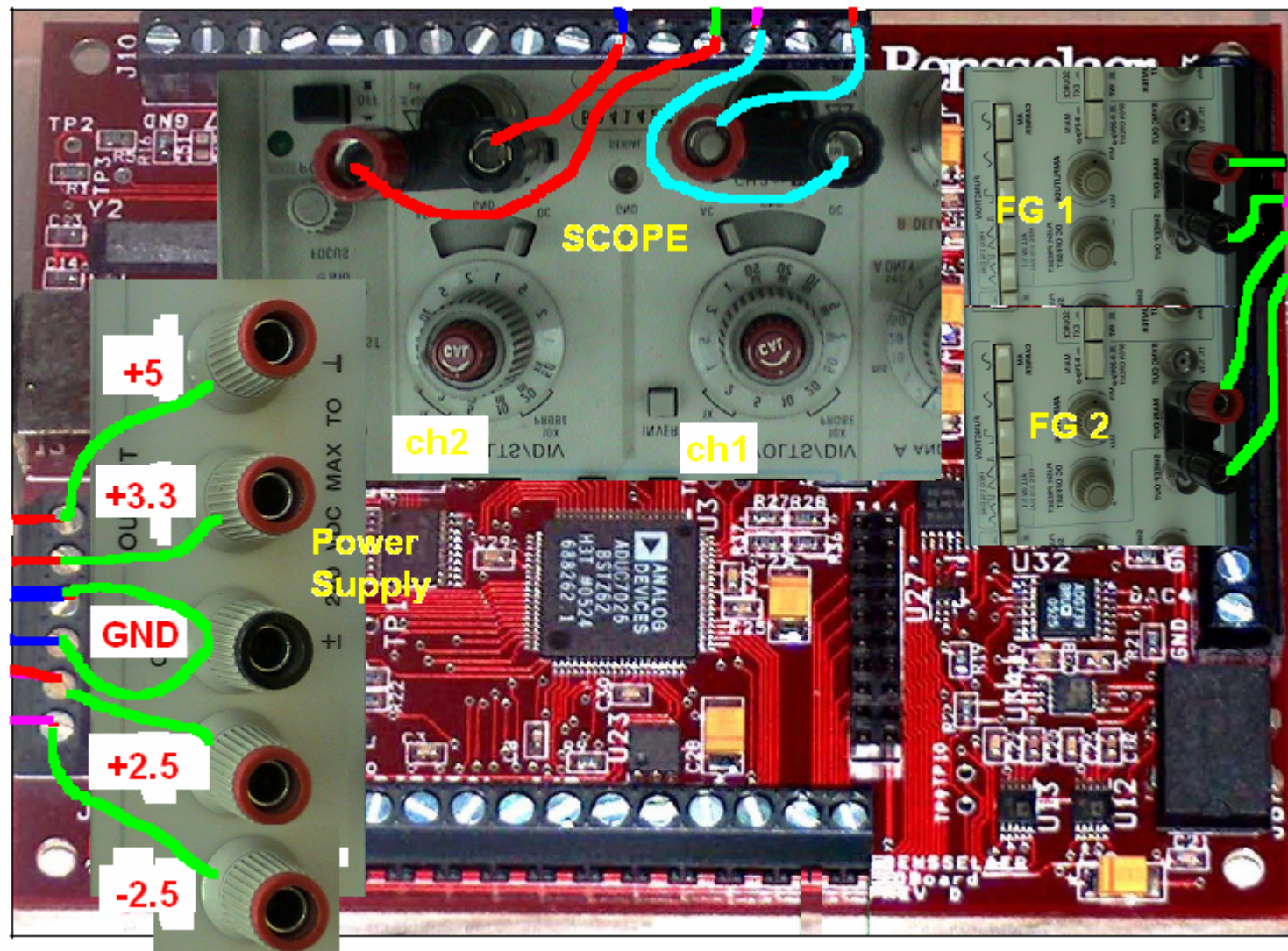


Equipment and Probe/Connector Substitution



- A Fixed +5V
- B Fixed +3.3V
- C Fixed +2.5V
- D Fixed -2.5V

In other words – 4 pieces of equipment inside the *IOBoard* !!



Mobile Studio Desktop Functionality





Oscilloscope

Scope Function

Mobile Studio Desktop

File Device Help

Rensselaer Mobile Studio Desktop

IOBoard (00000C3CCFFC)

Oscilloscope (00000C3CCFFC)

Display Options + Overlay + Windows +

Trigger

Mode: Auto

Source: Ch1

External: []

Slope: Rising

Set to 50%

Autoset

Status: []

Trigger Voltage: 0.000V

Horizontal

Time/Div: 500 μ s

Mode: Y-T

Sample Rate: 113.8 kSPS

Start

Channel 1

Volts/Div: 500 mV

Coupling: DC

Input: ADC1

Channel 2

Volts/Div: 500 mV

Coupling: DC

Input: ADC1

Math Channel

Volts/Div: 500 mV

Operation: CH1-CH2

Enable Channel: []

Horizontal Pos: 0.000ps

Done

8/28/2006 3:13 PM

start

Mobile Studio Desktop

EN

3:13 PM

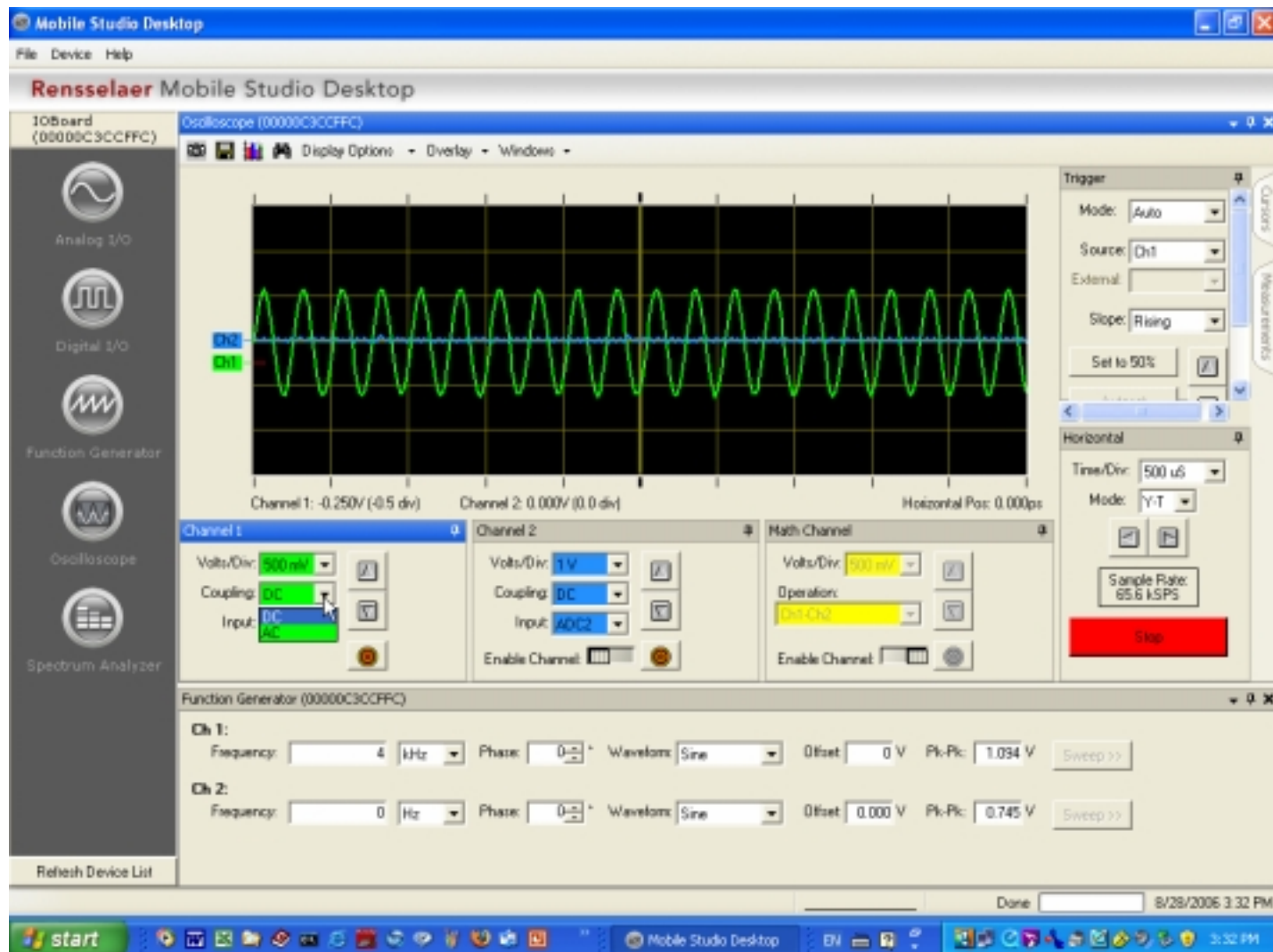


Oscilloscope

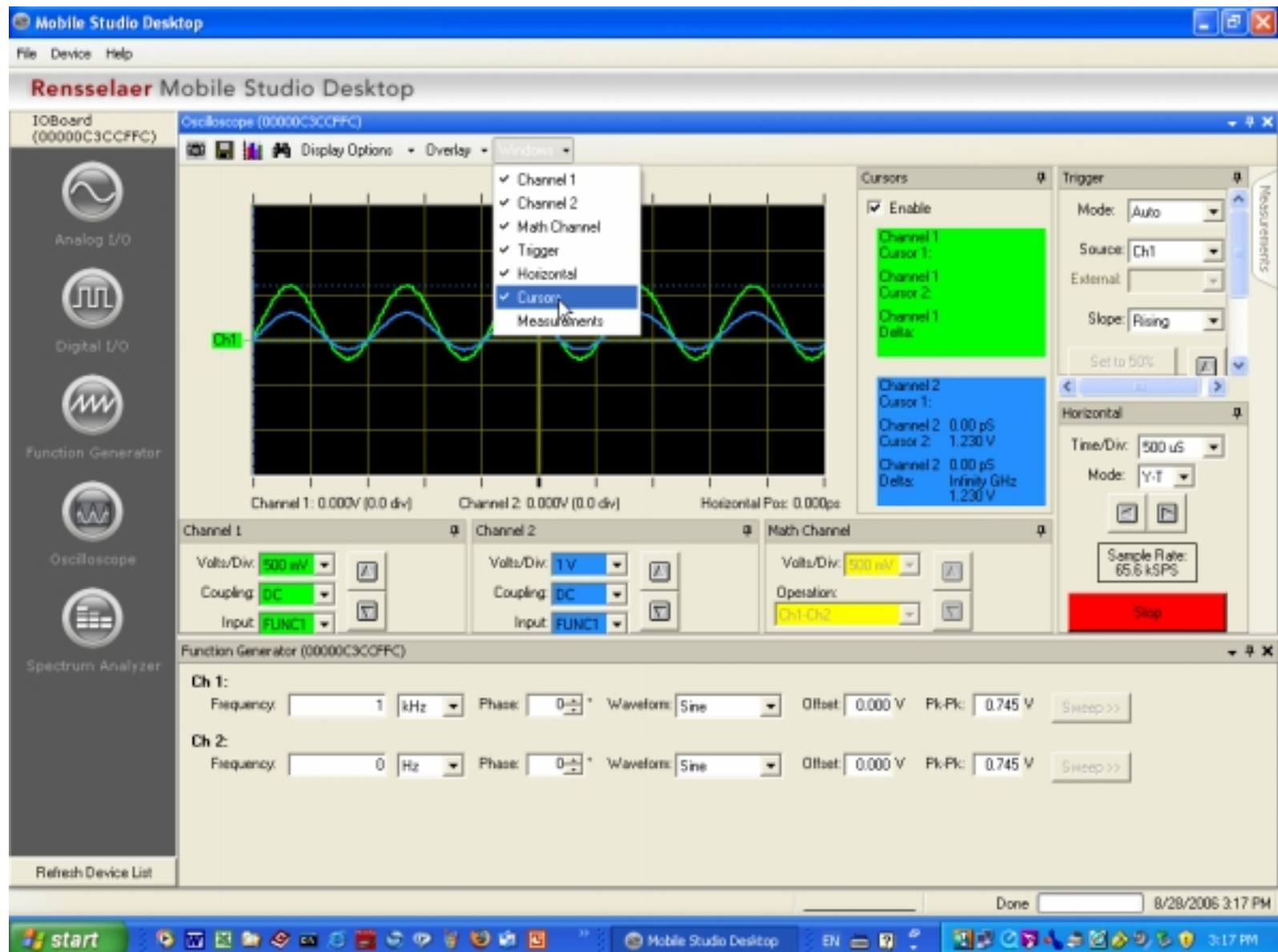
Scope and Function Gen Functions



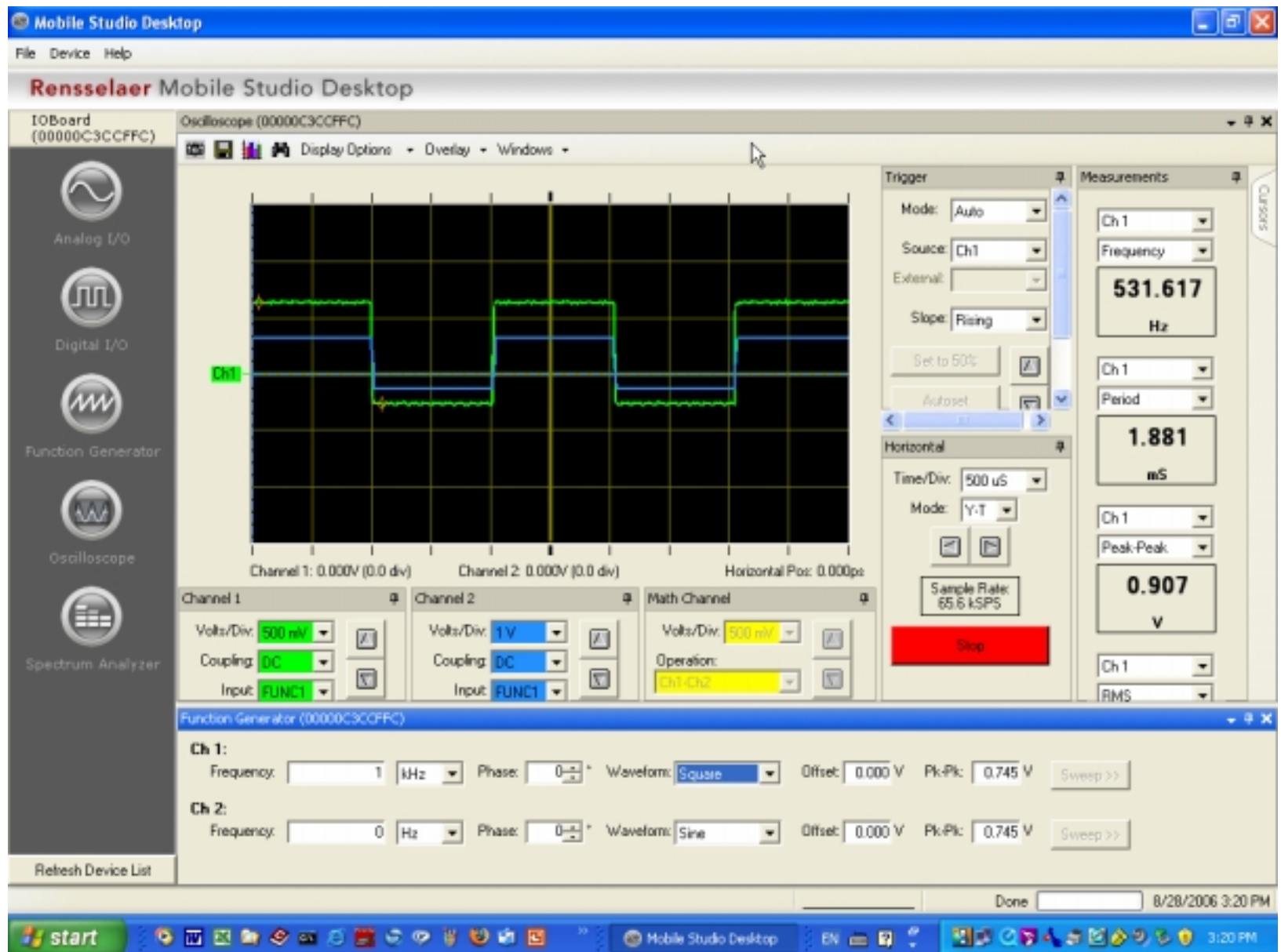
Function Generator



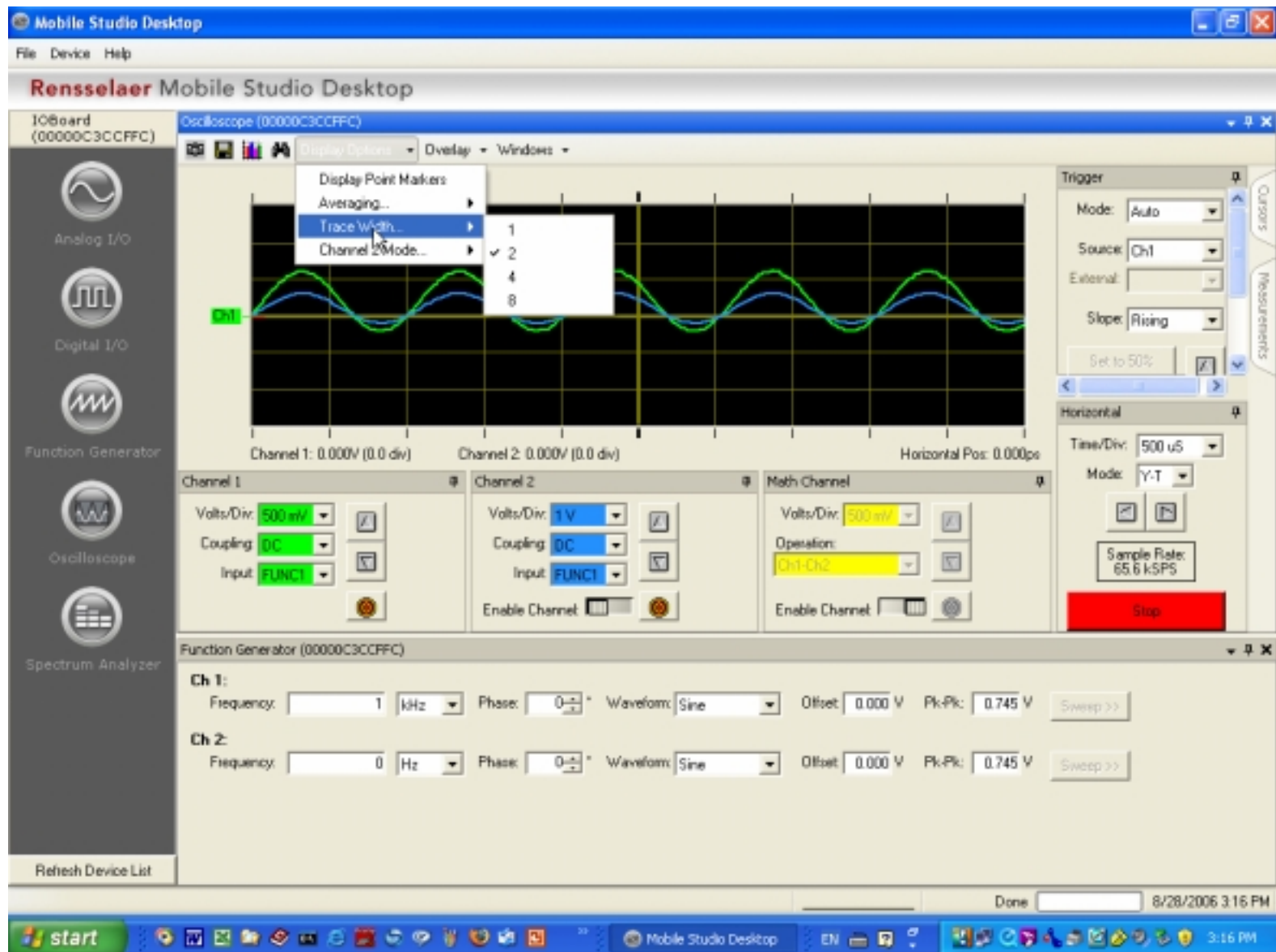
Scope & Function Gen with Cursor Option



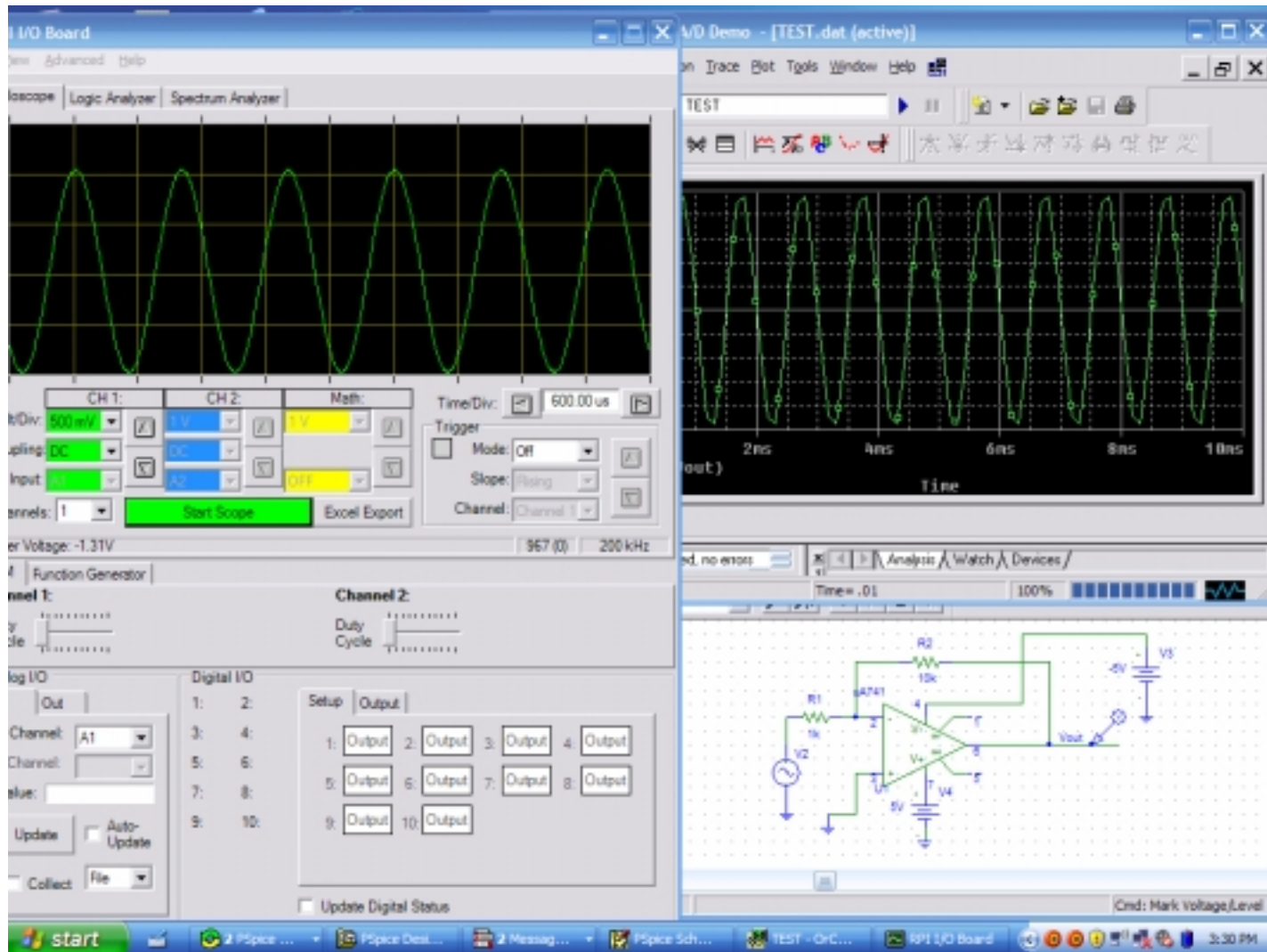
Scope & Function Gen with Measurement Option



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