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Revitalizing Electronics Programs

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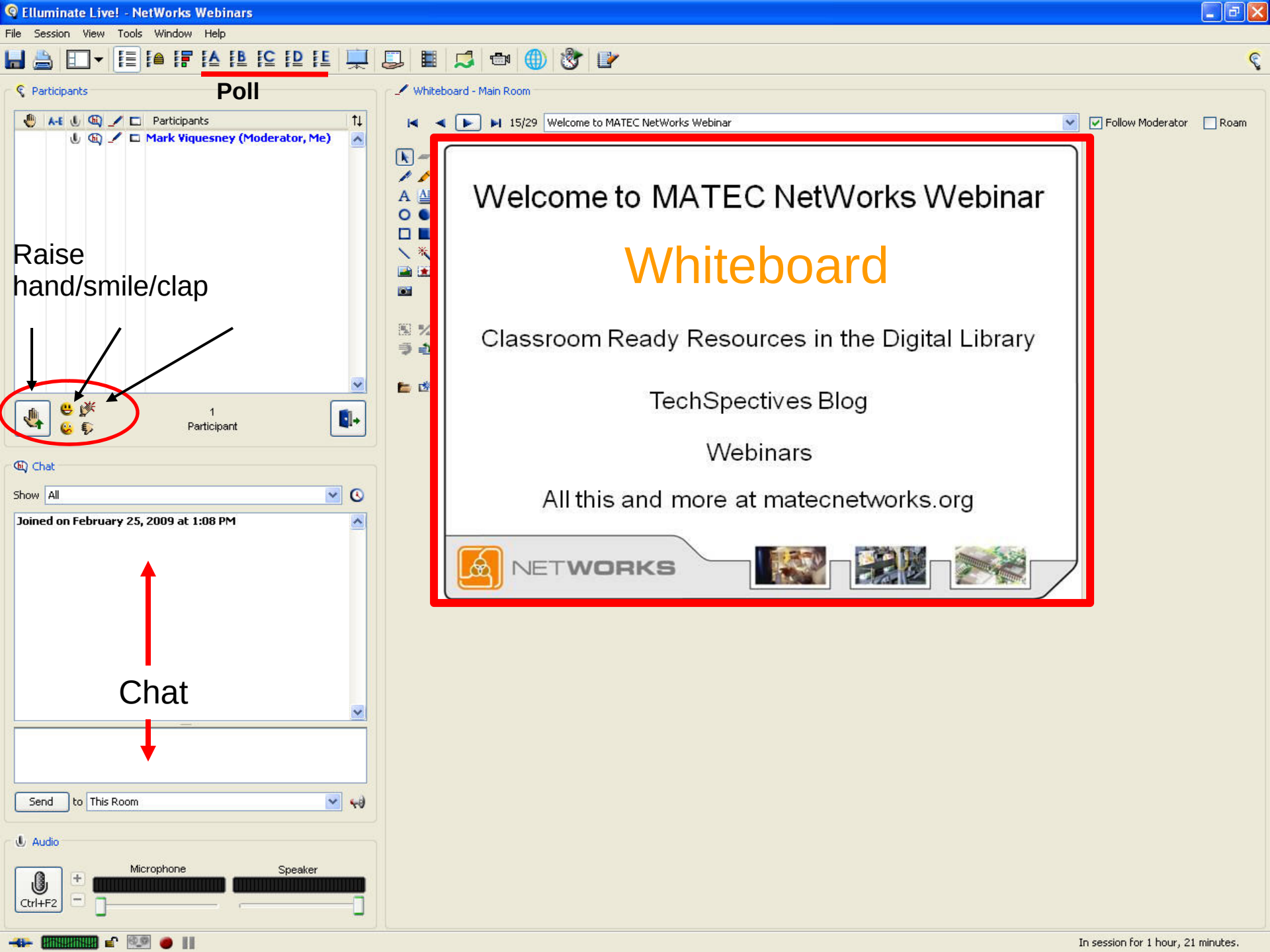
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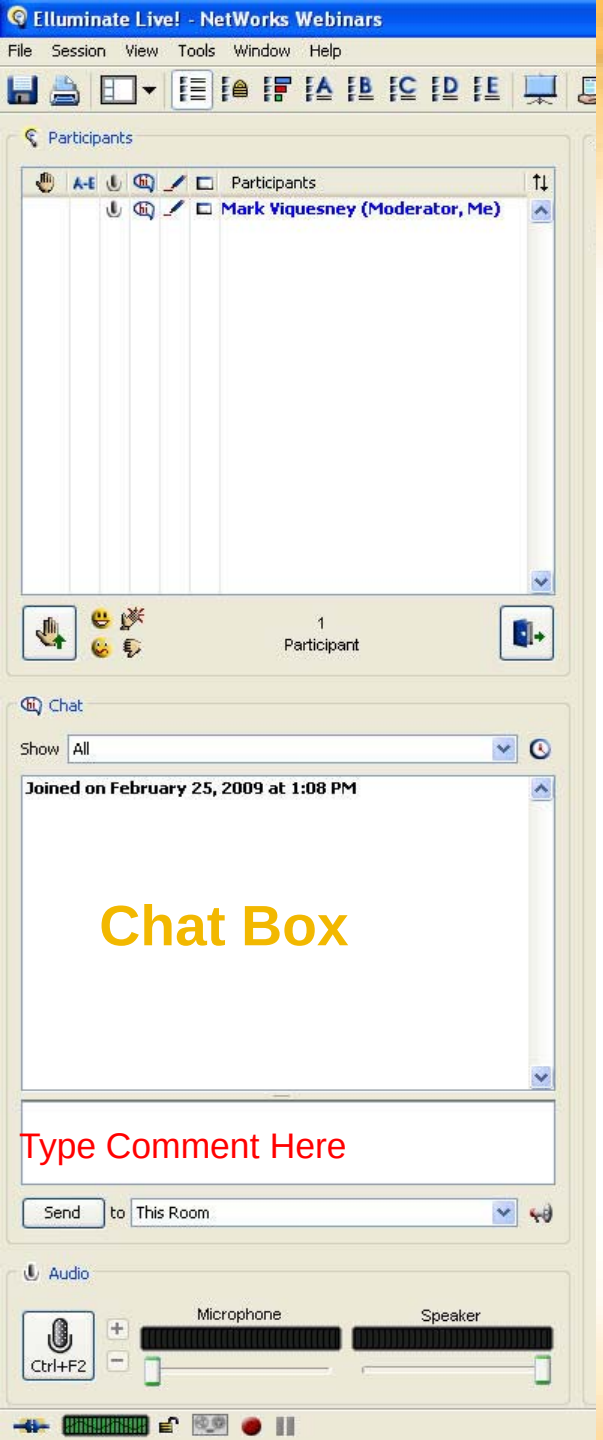

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please type the name of
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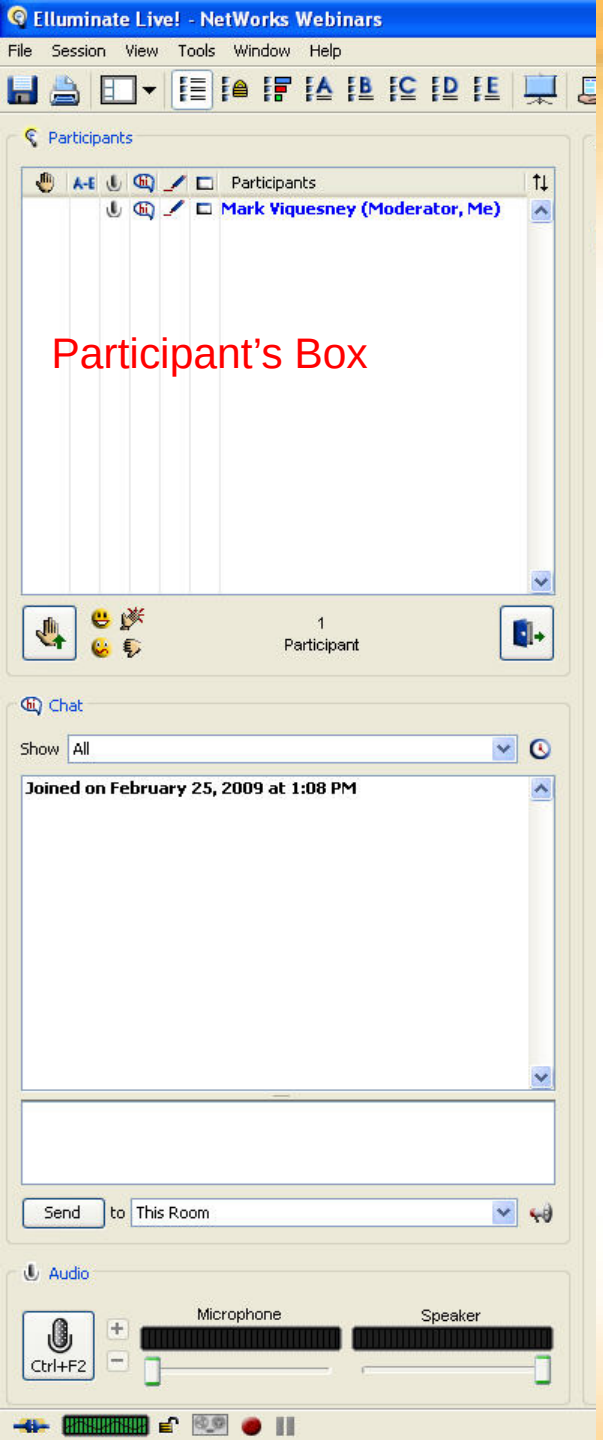
your location,
and how many people are attending with you today.



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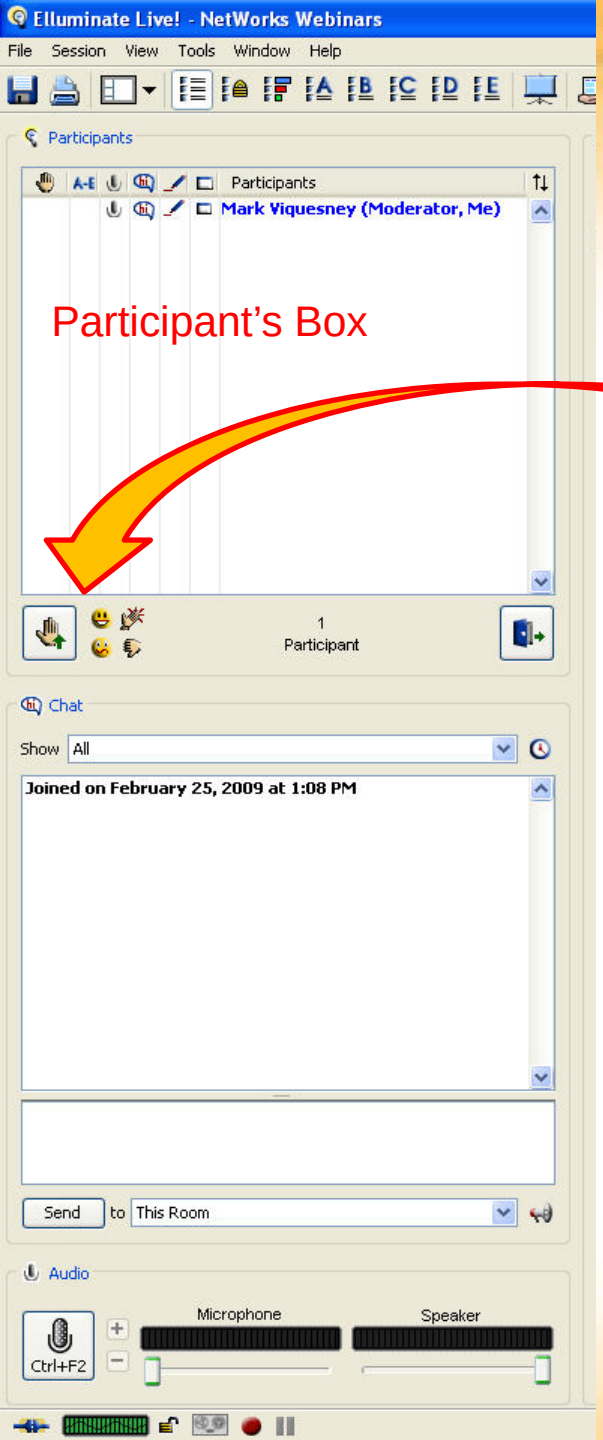
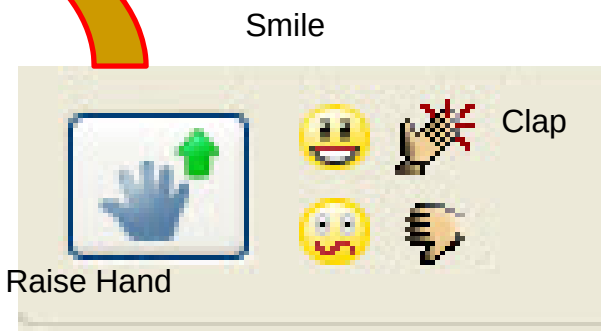
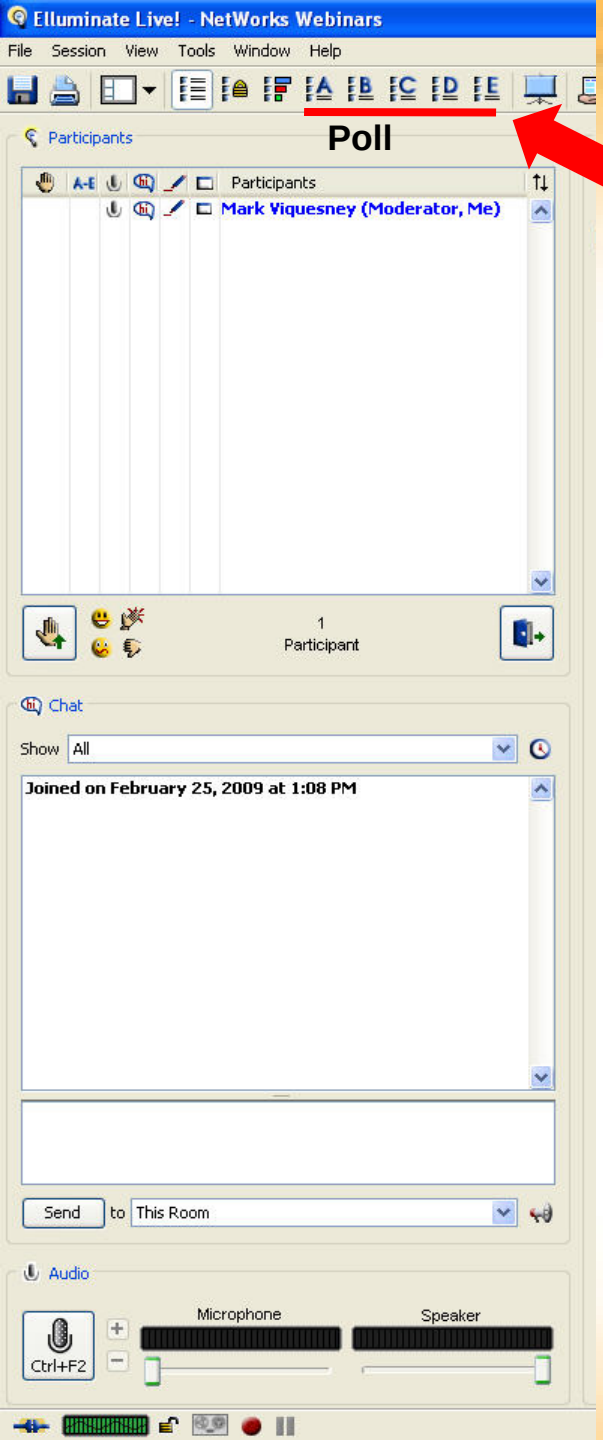
Allows you to non-verbally respond to the presenter's comments.

Participant's Box





Let the presenter know if you like what they say with a smile or clap. Raise a hand if you have a question – and then type it into the chat box.



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Click A-E to take the Poll

This webinar will have a Poll. Please answer: I heard about this webinar through:

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E. Other (please type where in chat box)

NetWorks Webinar Presenters

Tom McGlew:
Project Manger

Wayne Phillips:
Chabot College

Keith Sanders:
Columbus State Community College

Louis Frenzel:
Editor Electronic Design Magazine

MATEC NetWorks Revitalizing Electronics Technology Degree Programs

Maricopa Advanced Technology Education Center

NSF ATE Grant #0702753

A presentation of eSyst.org

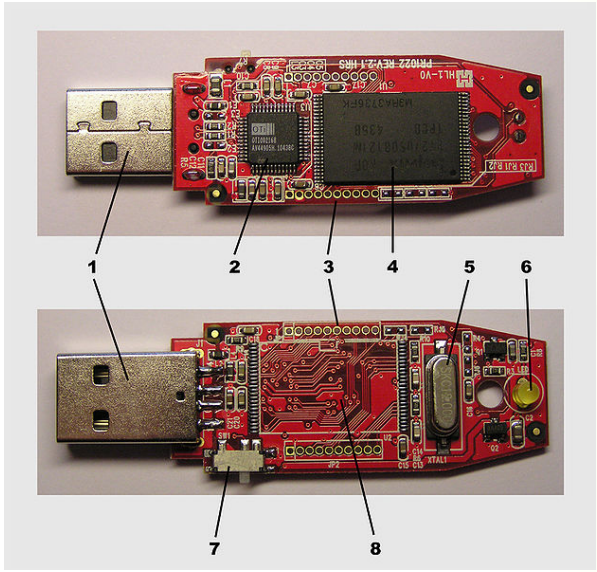
Webinar Agenda

- Overview of the Traditional versus Systems
- Presentation from Louis Frenzel
  - Editor Electronic Design Magazine
- Presentation from Keith Sanders
  - Columbus State Community College
- Presentation from Wayne Phillips
  - Chabot College
- Questions from Participants

Traditional versus Systems

So what has changed and what is a System?

Then to Now



Now to the future

eSyst Home Media Animation

http://esyst.org/Courses/Home_Theater/animation.html

Impact to Graduate Technicians

- Major implications for technicians.
  - Few if any engineering technician jobs.
  - Less troubleshooting to the component level.
  - More system troubleshooting, measurement and test.

Results in:

- Legacy programs being out of touch with reality.

Questions?

Type them in your chat window

Revitalizing Electronic Programs with eSyst

Louis E. Frenzel
Technology Editor
Electronic Design Magazine

Rationale for the Esyst Program

- Bring community college AAS degree programs in electronics technology (ET) into the 21st century.
- Educate the kinds of technicians needed in industry TODAY.
- Increase enrollments in AAS degree programs by making curricula more interesting, vibrant and relevant.

It is a Systems World

- Recognize that technicians work with systems and sub-systems and software.
- Technicians work less with components and circuits and more with ICs, modules, PC boards, sub-assemblies and complete pieces of equipment.
- Technicians spend their time on testing, measuring, installing, troubleshooting, servicing, repairing, calibrating, and operating at the systems level.

It is Time to Face Up to the Facts

- Technicians are not engineers.
- Technicians do not analyze or design circuits.
- The current ET curricula were designed for 1970/80s era engineering technicians. They have not materially changed.
- The position of engineering technician has almost disappeared from the job scene.
- Many ET AAS programs still focus on the engineering tech: circuit design and analysis.
- Many curricula are dated technically and preparing technicians for jobs that no longer exist.

What the eSyst Program Did

- Examined current technician needs in industry and validated their duties and tasks.
- Determined that most courses still focused on discrete components and circuits and less on ICs and larger systems elements.
- Determined that techs work with systems and sub-systems and less with circuits.
- Create a revised curriculum that uses the same course framework but adds a systems approach more in keeping with the real world.

The 6 Steps to Changing Your Program

1. Admit you have a problem. Own up to the fact that your program is probably dated and somewhat irrelevant in today's industry. Just because you do not believe it is a problem doesn't mean that it is not true.
2. Seek ways to revise your program. The eSyst recommendations can assist you in making the transition.
3. Get faculty buy-in.
4. Adopt a stronger relationship with industry in you area. Seek their input and guidance. Survey job needs.
5. Gradually revise the curriculum to take the systems approach and update it technically.
6. Aggressively promote the new approach to attract more students.

Remember this…….

- If you are experiencing lower enrollments, the reason may be your own program.
- Albert Einstein once said "The definition of insanity is doing the same thing over and over again and expecting different results".
- Change is the only solution.
- What other option is there except eSyst?

Just What is the Systems Approach?

- Emphasis on the big picture and less on individual components and circuits.
- More block diagrams and less schematics.
- More on testing, measuring and troubleshooting.
- Spend time with the eSyst website and www.esyst.org.
- Update courses and curricula with online materials like those from the NSF Work Ready Electronics (WRE) project. www.work-readyelectronics.org.
- Check out the new book *Electronics Explained (Newnes/Elsevier, 2010)* by Lou Frenzel, the first book to present the systems view at the technician level.
- Check my blog at www.electronictech.blogspot.com.

What I Did

- I teach electronics as an adjunct professor at Austin Community College.
- Courses I teach: DC, AC and Semiconductor Circuits.
- Used the WRE modules for in-class presentations and for online student activities.
- Followed the eSyst guidelines for what to omit and what to add in each course.
- Used many of the presentations and labs from the eSyst library.
- It works. Enrollments are up.
- Courses still meet all state and accreditation conditions.

Questions?

Type them in your chat window

Embracing the Systems View

Electronic Engineering Technology at Columbus State Community College

Presented to MATECNetWorks Webinar

May 14, 2010

By Keith Sanders
EET Program Coordinator/Assistant Professor
Columbus, Ohio

Topic Preview

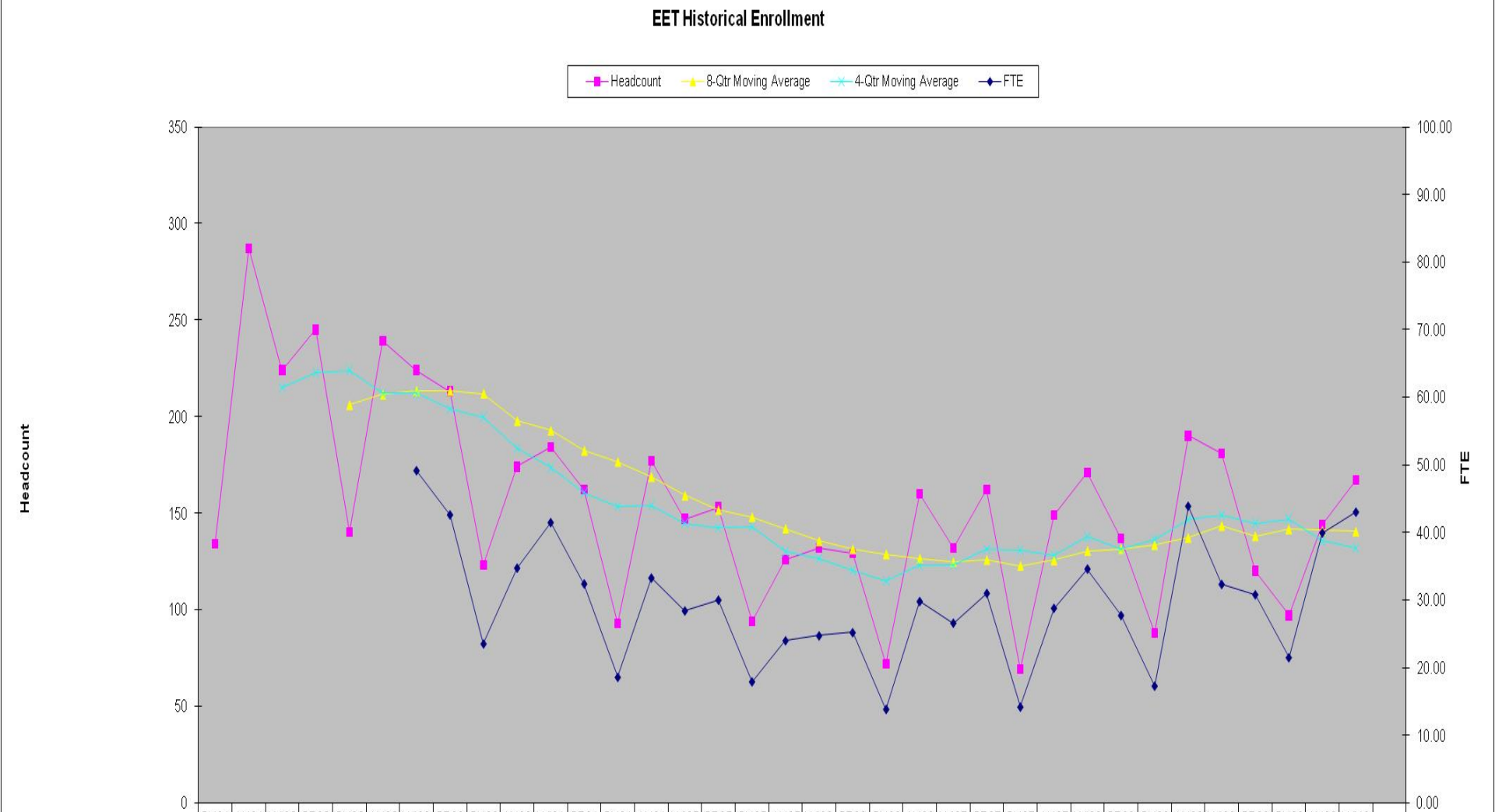
- Historical Perspective/CSCC Enrollment Trends
- Research and Investigating
- National Science Foundation and MATEC
- The Decisions We Made
- Sample of Course Systems Lab Concepts
- Existing Challenges

Historical Perspective and Enrollment Trends

Legacy Electronics Program

- 1963
  - Columbus Area Technician's School
    - EET Enrollment Peak 35(?)
- Mid-1970s
  - Columbus Technical Institute
    - EET Enrollment Peak 300(?)
- Mid-1980s
  - Columbus State Community College
    - EET Enrollment Peak 600(?) with 5 full-time faculty members
- Today
  - CSCC
    - EET Average Enrollment 120-150, with 1 full-time faculty member

EET 9-Year Enrollment History



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Headcount	134	287	224	245	140	239	224	213	123	174	184	162	93	177	147	153	94	126	132	129	72	160	132	162	69	149	171	137	88	190	181	120	97	144	167
8-Qtr Moving Average					206	212	213	213	212	198	193	182	177	169	159	152	148	142	136	131	129	127	125	126	123	126	131	132	134	137	143	138	142	141	141
4-Qtr Moving Average			215	223	224	212	212	204	200	184	174	161	153	154	145	143	143	130	126	120	115	123	123	132	131	128	138	132	136	147	149	145	147	136	132
FTE							49.13	42.60	23.53	34.73	41.46	32.40	18.60	33.27	28.40	30.00	17.93	24.00	24.73	25.20	13.87	29.80	26.60	31.00	14.20	28.80	34.60	27.73	17.30	43.87	32.33	30.80	21.50	39.93	43.00

Sample of Research Sources

- Visits to 5 Community Colleges in Ohio
  - The Disappointing Search for a Flourishing Program - 2004
- Conferences
  - 2005 ASEE
  - 2006 and 2007 SAME-TEC
  - 2009 HI-TEC
- Sample of Literature Review
  - The Disappearing Associate Degree Program In Electronics Technology - *American Society for Engineering Education, Conference Proceedings, 2003*
  - Are Today's Electronics Technology Programs Doomed To Extinction Or Is Their Mission Changing? - *American Society for Engineering Education, Conference Proceedings, 2007*

The Decision We Made

- Change Curriculum to Systems View
- Phased Implementation over 2 years
- Began with Catalog Changes Effective AU08

EET Core Curricula Only
(not a direct course-to-course correlation)

Legacy Approach	Systems Approach
DC Fundamentals	Basic Electronic Systems
AC Fundamentals	
Digital Fundamentals I	Basic Digital Systems
Electronic Devices I	Electronic Switching Systems
Digital Fundamentals II	Advanced Digital Systems (FPGAs)
Electronic Devices II	Data Acquisition Systems
Microprocessors	Embedded Microcontroller Systems

Sample Systems Lab Concepts

- Basic Electronics Systems
  - Automobile panel instrument backlighting
    - Series DC adjustable illumination
  - Automobile main lighting system
    - Parallel DC lighting with independent controls
  - Integrated chip cooling system (eSyst Lab)
    - Temperature-to-Voltage transducer and fan control
  - Audio system equalizer and amplifier
    - Passive cascaded filters with band volume control

Sample Systems Lab Concepts

- Basic Digital Systems
  - Traffic control system
    - Combinational logic
    - Sequential logic
    - Timing circuits
  - Secure access system
    - Keypad entry
    - Memory storage and retrieval
    - Shift registers and comparators

Sample Systems Lab Concepts

- Electronic Switching Systems
  - Cell phone or laptop battery charger
    - AC-DC rectifier
    - Voltage regulator
  - PC Power Supply
    - DC-DC converters
  - Uninterruptible Power Supply
    - DC-AC inverter
    - Power factor compensation

Existing Challenges

Existing Challenges

- State-mandated curriculum is legacy view
- Adjunct faculty resistance to change
- Employer perceptions slow to change
- ABET re-accreditation visit Autumn 2010
- Validation of results
- Continuous improvement

Alternatives to State Mandates

- Required DC Circuits topics
  - Circuit theorems such as:
    - Superposition
    - Thevenin's Theorem
    - Norton's Theorem
    - Mesh/Nodal Analysis
- Alternatives
  - Software applications
    - Electronics Workbench/NI MultiSim

Alternatives to State Mandates

- Required AC Circuits topics
  - Complex Numbers and Phasors
- Alternatives
  - Systems Applications
    - Power factor compensation in Power Transmission
    - Power factor compensation in DC/AC Inverters
      - Uninterruptible Power Supplies
      - Wind Turbines

Alternatives to State Mandates

- Required Digital Electronics topics
  - Logic Minimization
    - Boolean Algebra
    - DeMorgan's Theorem
    - Karnaugh mapping
- Alternatives
  - Software applications
    - Logic Friday
    - VHDL

Adjunct Faculty

- Gradually replacing those who are unwilling to support the new curriculum
- Training new adjunct faculty in the Systems View and its advantages

Employer Perceptions

- Introduced an internship pilot program with one of the largest employers in central Ohio
- Quickly learned about our students' capabilities and hired 9 of them.
- Spreading the word to others who believe we are still a legacy electronics program

Thank you!

- Thank you for granting me the opportunity to share a little insight into Columbus State's EET Program
- Thanks to the MATEC Staff, especially Tom McGlew and Lou Frenzel for their tireless effort…I believe the tide is beginning to turn…slowly.

Questions?

Type them in your chat window

ESYS: Electronic Systems Technology

Wayne Phillips
Chabot College
Hayward, CA

ESYS Program Overview

- What is ESYS?
- The 16 ESYS courses
- The 8-week hybrid course schedule
- Early results and comments

What is ESYS?

- The Electronic Systems Technology (ESYS) Program
  - Emphasizes the use, maintenance, troubleshooting and repair of electronic systems
  - Less concentration on individual component and circuit analysis
  - Incorporates the communication and reporting skills needed in industry

The 16 ESYS courses

- ESYS 50 - Introduction to ESYS
- ESYS 51 - Fabrication Techniques
- ESYS 52 - Measurement & Troubleshooting
- ESYS 53 - Personal Computer Systems
- ESYS 54 - Analog Circuits & Semiconductor Devices
- ESYS 55A - Microcontroller Systems
- ESYS 55B - Digital Logic Systems

  - Detailed information on all courses may be found in the college catalog at http://www.chabotcollege.edu/academics/catalog/
  - Or the ESYS website at http://www.chabotcollege.edu/esys/

The 16 ESYS courses (continued)

- ESYS 56A & 56B - Electronic Power Systems I & II
- ESYS 57A - Process Control Systems
- ESYS 57B - PLC & Robotic System Components
- ESYS 58 - Wireless Communication Systems
- ESYS 59 - Communication Network Systems
- ESYS 60 - Electronic Systems Analysis
- ESYS 61 - ESYS Project Management
- ESYS 62 - Home Technology Systems

The 16 ESYS courses

- Five courses with NO PREREQUISITES:
  ESYS 50, 51, 53, 59, and 62

- Three courses with ESYS 50 as the only prerequisite:
  ESYS 52, 55A, and 56A

- ESYS 60 is the only course with a math prerequisite:
  - INDT 74 – Measurements and Calculations
    or
  - eligible for MATH 55 – Intermediate Algebra

ESYS Course Highlights

- ESYS 50 • Intro to ESYS
  - DC V, I, R, P: compare, contrast, measure
  - Collect and present data (Excel)
  - AC waveform measurement
  - RC and L/R time constants
  - AC complex/polar math is NOT introduced until Circuit Analysis, ESYS 60

ESYS Course Highlights

- ESYS 54 • Analog Circuits & Semiconductor Devices
  - System-on-Chip analog devices
  - Op-Amp circuits
  - MOSFET transistors and circuits
  - Bipolar transistors and circuits

ESYS Course Highlights

- ESYS 55A • Microcontroller Systems
  - Defining and applying digital I/O
  - Mux, adders, shift reg
- ESYS 55B • Digital Logic Systems
  - FPGA used instead of SSI TTL to demonstrate basic logic functions

ESYS Course Highlights

- ESYS 56A • Electronic Power Systems I
  - Build, test, and troubleshoot solar electric, wind, and fuel cell systems in the lab
  - Test and troubleshoot common power supply systems
- ESYS 56B • Electronic Power Systems II
  - Linear supplies: rectification, filtering, regulation
  - SMPS: Buck/boost, PWM

8-week hybrid course schedule

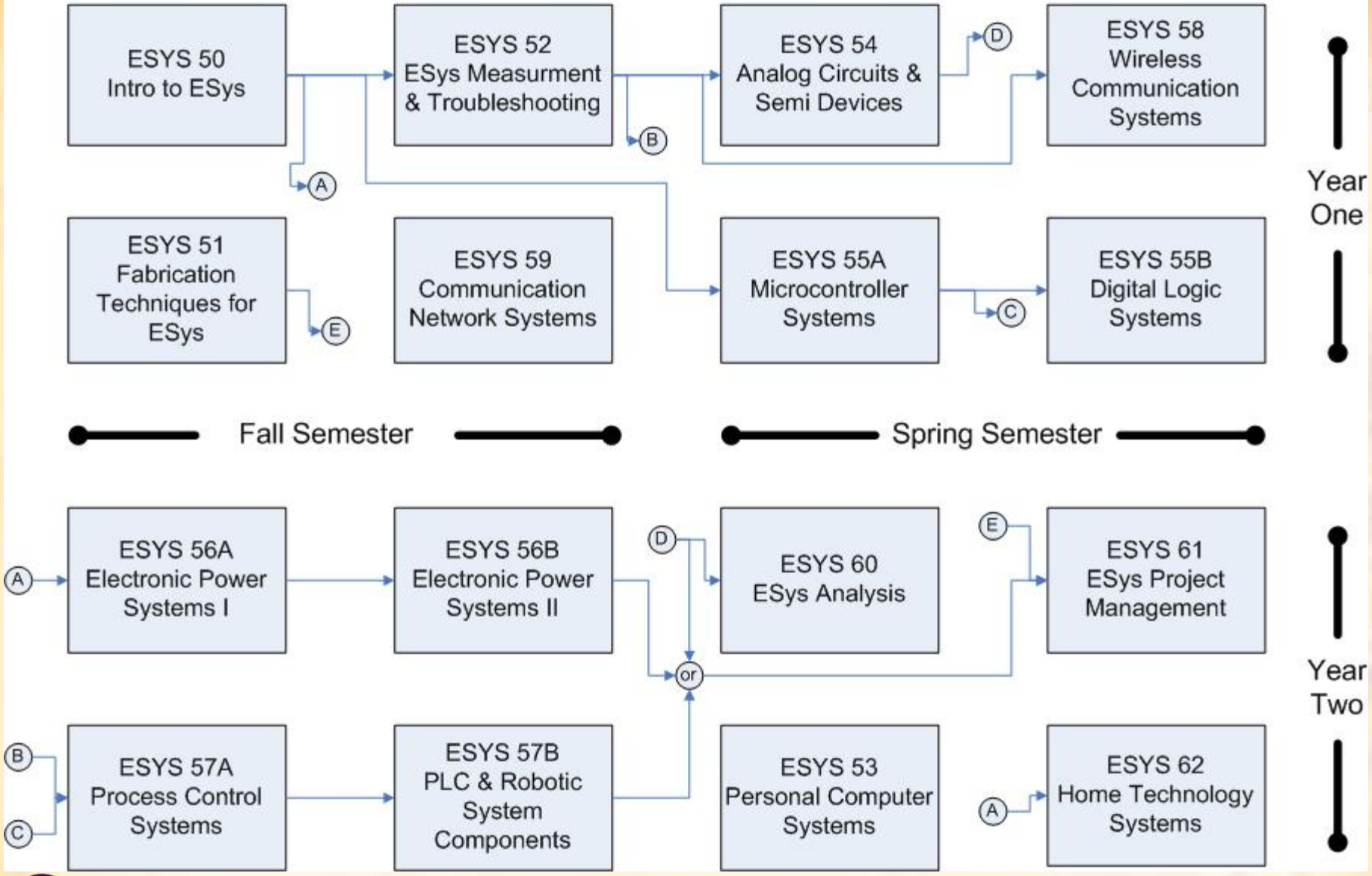
- All 16 courses are 1 unit lecture, 1 unit lab
- All courses are 8-week short-term courses
- Lectures are provided in online format
- Labs are in-class, 4 hours, 1 night/week per course
- Online lecture allows one instructor to teach labs for two courses concurrently, boosting productivity
- Each 8-week session includes at least one no-prerequisite course (ESYS 50, 51, 53, 59 or 62)

8-week hybrid course schedule

- A typical student load is two courses per 8-week session (4 courses per semester)
- All ESYS courses for AS degree can be completed in four semesters
- 8 courses for ESYS certificates can be completed in three semesters
  (starting Fall 2010)

Electronic Systems Technology Course Map

All courses are 8 weeks, 2 units
1 hr. online lecture, 2 hr. in-class lab



Early Results

	Fall Semester 2009	Spring Semester 2010
Enrollment at census	97	101
Completed with C or better	80	86
Number of sections offered	9	10
Instructor load (FTEF)	1	.83

Source: Chabot College enrollment management. Spring data is preliminary. 11 sections and 1 FTEF load scheduled Fall 2010.

Student Responses

- What the students say:
  - “This is fun!”
  - “I saw this today at work.”
  - “Which course do I take next?”
- What the students have not said:
  - “Where will we use this?”
  - “Why are we learning this?”

Instructor Comments

- Course pathways for students need repeated visibility.
- Textbooks (or lack thereof) still an issue
  - Online text and resources make sequencing easier.
  - Some topics (MOSFETs, Op-Amps) assume prior knowledge of BJTs.
- This is a lot of work, and a lot of fun!

For More Information

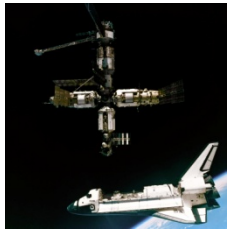
- Contact Wayne Phillips at wphillips@chabotcollege.edu
- Visit the ESYS webpage at http://www.chabotcollege.edu/esys

Questions?

Type them in your chat window

Nida Corporation

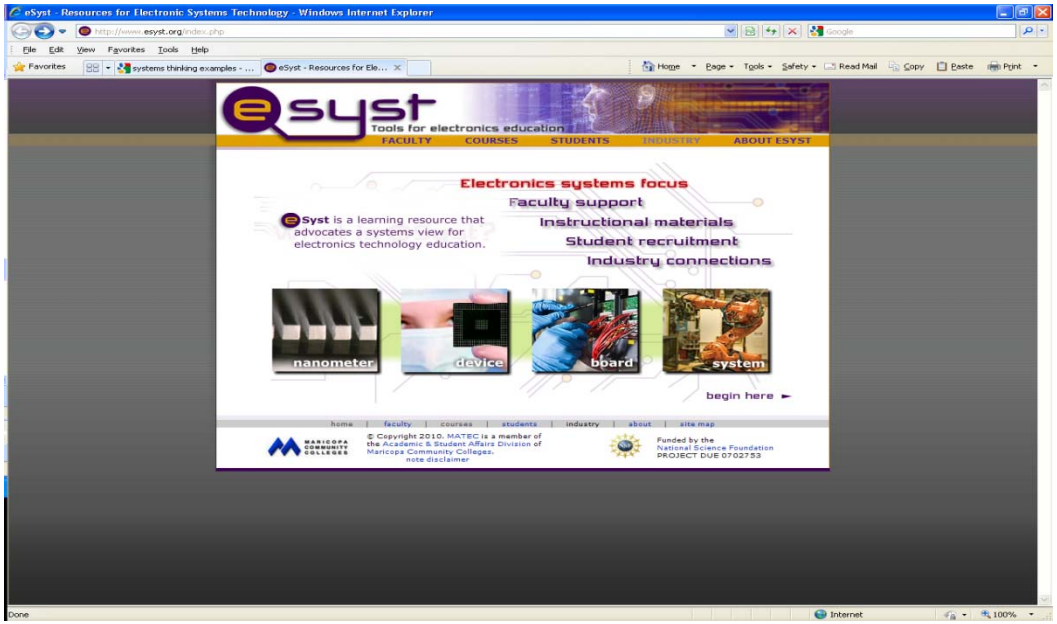
Next Generation Electronics Training Summit



Summit Recommendations

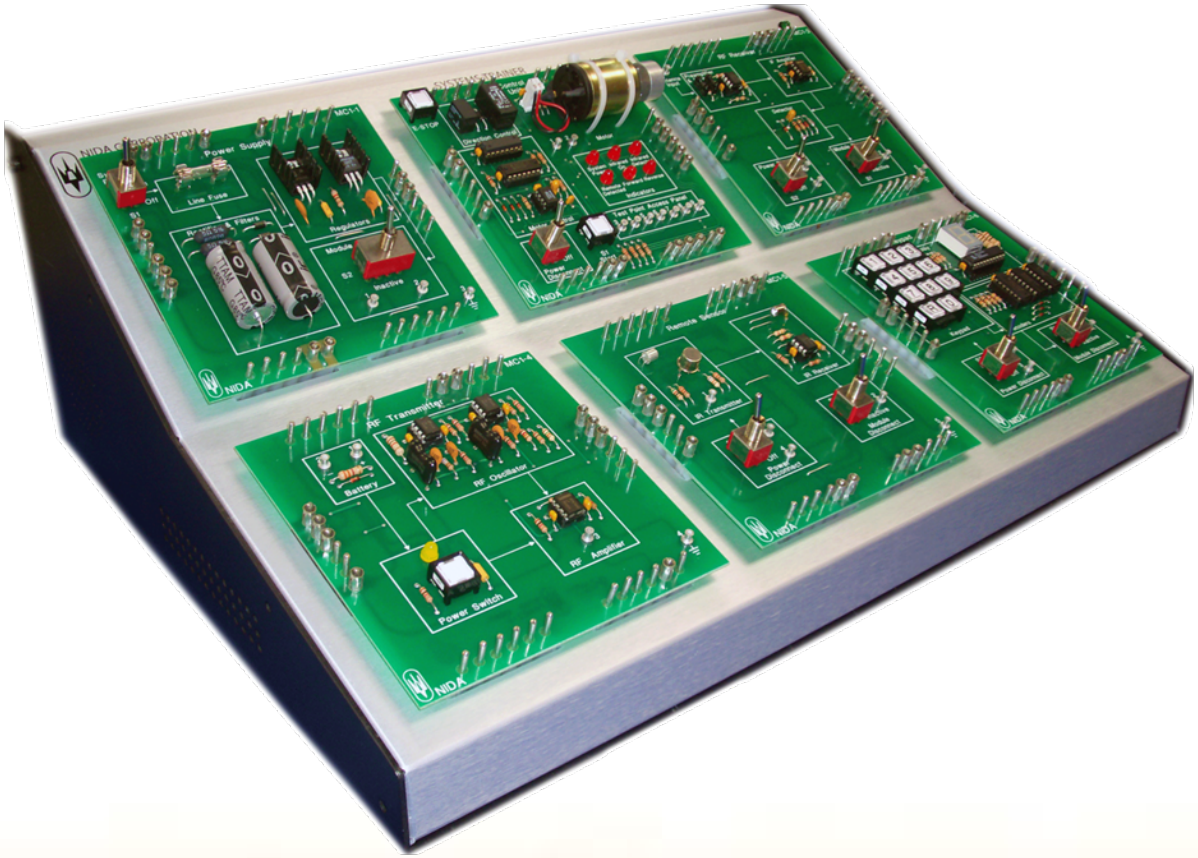
- Troubleshoot to the LRU v. Component Level
- Understand how to use Block Diagrams
- Understand what the test equipment is reporting
- Develop a Systems Thinking Approach to Troubleshooting

http://www.esyst.org/index.php



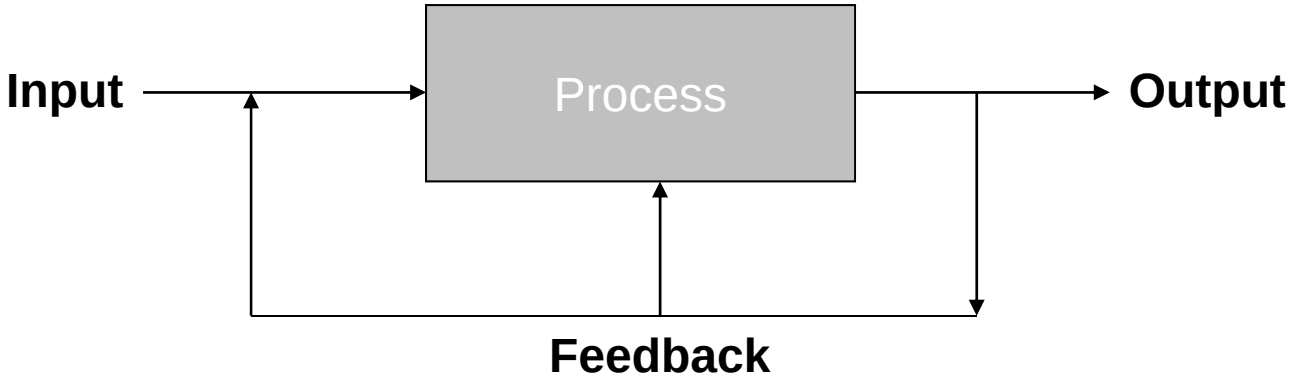
NSF funded Advanced Technological Education Center

Introducing the 360S



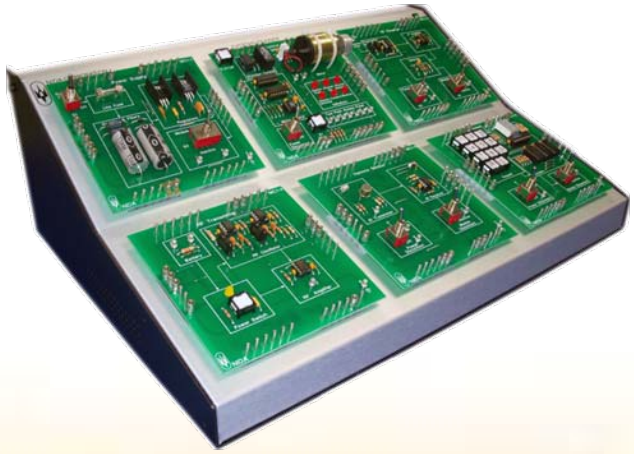
“Systems” Thinking and Troubleshooting

- Knowing how to work on the system versus knowing how the system works.
- Understanding the General Systems Model.



A Systems Approach to Teaching Electronics

- Energy Systems
- Industrial Process and Control Systems
- Three-Phase Power Systems
- Fire, Security, and Access Control Systems
- Inventory Control Systems
- Biomedical Systems
- HVAC Systems
- Communications Systems
- Military Support Systems



Questions?

Type them in your chat window

How Can We Better Serve You?

Whether you are joining us live or watching the recorded version of this webinar,
please take 1 minute to provide your
feedback and suggestions.

http://questionpro.com/t/ABkVkZF5Gf

Thank you for attending

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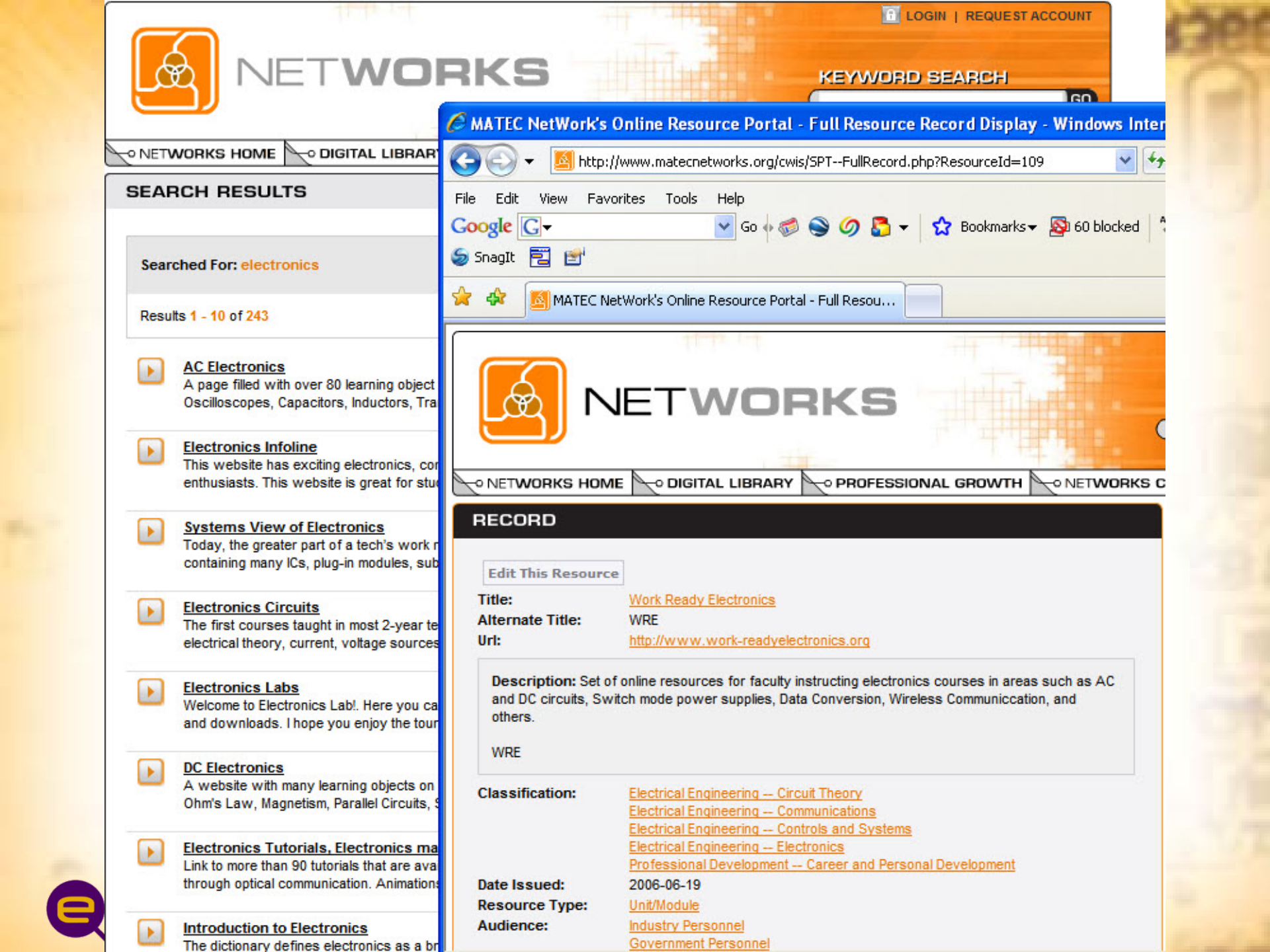
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Today, the greater part of a tech's work r
containing many ICs, plug-in modules, sub
Electronics Circuits
The first courses taught in most 2-year te
electrical theory, current, voltage sources
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Introduction to Electronics
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Title: Work Ready Electronics
Alternate Title: WRE
Url: http://www.work-readyelectronics.org
Description: Set of online resources for faculty instructing electronics courses in areas such as AC and DC circuits, Switch mode power supplies, Data Conversion, Wireless Communiccation, and others.
WRE
Classification:
Electrical Engineering -- Circuit Theory
Electrical Engineering -- Communications
Electrical Engineering -- Controls and Systems
Electrical Engineering -- Electronics
Professional Development -- Career and Personal Development
Date Issued: 2006-06-19
Resource Type: Unit/Module
Audience:
Industry Personnel
Government Personnel

Welcome MarkViquesney

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KEYWORD SEARCH

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Can you guess what this image is?

- If you guess correctly, you will be entered into a prize drawing.
- EMAIL your answer before 12/31/09.

The answer & winner will be revealed in the Jan./Feb. @MATEC

TECHSPECTIVES BLOG

Join a discussion or start your own at TECHSPECTIVES

THIS FRIDAY - FREE WEBINAR
by Mark Viquesney - Dec 08, 2009
This semester I had a very interesting group of students - One student was in

- THIS FRIDAY - FREE WEBINAR
- ON THE WINGS OF A BUTTERFLY
- REACHING AND TEACHING ACROSS GENERATIONS - FREE WEBINAR DECEMBER
- 10 EMERGING TECHS FOR 2010

COMMUNITY RESOURCES

NETWORKS Community Resource Links.

- FACULTY ADVISORY BOARD
- RECOMMENDED LINKS
- NATIONAL SURVEY RESULTS - 2009

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