Classroom Teaching with Collaborative Network Technologies

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Classes Taught & Instructional Needs

• Computer Programming in JAVA (Ugrads).
• Systems Modeling & Simulation (Ugrads & Grads).
• Applied Machine Vision (Ugrads & Grads).
• Characteristics of these classes:
  • Computer intensive.
  • Understanding by “Building” Knowledge.
  • Linked to “What if” Scenarios or “Physical” Experiments.
BAE Engineering Education Needs

- More “hands-on” experiential learning for students.
- More “collaborative” activities between teacher-student & student-student.
- More immediate feedback on concepts being discussed or applied in class.
- More involvement of off-campus faculty in teaching students in Athens. Distance & Time are the main constraints.
BAE Approach

• Combination of Video Conferencing & Network Control technologies to provide as much as possible Real-Time Control & Collaboration between PCs from local sites as well as from remote sites:
  • Room 310 – Electrical & Electronics Lab.
  • Room 219 – Collaborative Distance Education Lab.
• Funded with BAE & CAES funds, UGA Student Tech. Fees & Learning Technology Grants over 2+ years.
Teacher Stations Wide Area Network
(using NetSupport Manager)

Athens

Tifton

Griffin

NSM can link

Data

Video Conferencing

2 -> 1

1 -> 2
Room 219 (Local Teaching Mode) (using NetSupport School)

Athens Teacher PC

NSS links
1 -> 30

30 Student PCs
Room 219 (Remote Teaching Mode)

Remote Teacher PC

Minimize Long Distance Ethernet Traffic

All PC applications run on Athens Teacher PC

Athens Teacher PC

Student PCs
CDE Lab Classroom Design

- Standard layout.
- Separate projection screens for data and video conferencing.
Remote Teacher Presence & Data Screen

“Talking Head”

Data Screen

- The key parameters for the Grating Equation (48) are in the file "Grating Equation, JS", (see also slides #21 & 22 of JCT, 4540.3, PPT).
- In the JS is: \[ \sin \beta = \frac{m \lambda}{d} - \sin \delta \]
- Case 2 (when \( \delta = 0 \), fourth order Ray).
PC Local Interactions using NetSupport School
One-on-One: Watch-Share-Control
Show Teacher to Student(s)

NetSupport School Pro - Show

Ready to start showing to:

- Client (none selected)
- These Clients

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑ Brian</td>
<td></td>
</tr>
<tr>
<td>☑ Emma</td>
<td></td>
</tr>
<tr>
<td>☑ Jody</td>
<td></td>
</tr>
<tr>
<td>☑ Robert</td>
<td></td>
</tr>
</tbody>
</table>

Removing the check mark next to a Client excludes it from the Show.

- Set Show Mode at Client: Full Screen
- Show icon on taskbar
- Enable Audio Support

Show | Cancel | Help | << Basic
Build Group Project by switching “Show Leader” among students
Exhibit Student Work

Exhibit Client

Ready to start exhibiting Client Brian to:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emma</td>
<td></td>
</tr>
<tr>
<td>Robert</td>
<td></td>
</tr>
<tr>
<td>Jody</td>
<td></td>
</tr>
</tbody>
</table>

Removing the check mark next to a Client excludes it from the Exhibit.

- Set Show Mode at Client
  - Full Screen
Scanning Student PCs

NetSupport School Pro - Scan

Scan the following Clients:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brian</td>
<td></td>
</tr>
<tr>
<td>Chris</td>
<td></td>
</tr>
<tr>
<td>Emma</td>
<td></td>
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<tr>
<td>Jody</td>
<td></td>
</tr>
<tr>
<td>Robert</td>
<td></td>
</tr>
</tbody>
</table>

Removing the check mark next to a Client excludes it from the Scan.

Scan Interval

- Short
- 7 seconds
- Long

Display one Client at a time

Display multiple Clients at a time

2x2
### Send / Collect Work Macros

Select an operation from the list and click Send Work or Collect Work. Add a new operation by clicking New, modify an existing operation by selecting it and clicking Properties.

<table>
<thead>
<tr>
<th>Description</th>
<th>Last Sent</th>
<th>Last Collected</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 12 Maths 1</td>
<td></td>
<td>(never)</td>
<td></td>
</tr>
<tr>
<td>Year 11 Maths 1</td>
<td></td>
<td>(never)</td>
<td></td>
</tr>
</tbody>
</table>

Buttons:
- Send Work
- Collect Work
- New
- Remove
- Properties
- Reset
- Close
- Help
Student Survey

Question

Is the "reference" to an array a memory address?
Approved Applications List
Approved Web Sites List

Approved Sites

<table>
<thead>
<tr>
<th>URL</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://www.engr.uga.edu">www.engr.uga.edu</a></td>
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</table>

Restricted Sites

<table>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
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</table>

Ready Connections: 24  24 Clients All: 24
CDE Lab & Applied Machine Vision Course

Remote Administration

Students from their home for experiments

Collaborative DE Lab

Teacher Station (NSS-NSC-Silicon Chalk)

MV Station 1

MV Station 2

Web/FTP Server W2003

QuantIm

Spectral Imaging Lab

Home PC

Tablet PC

Student PCs

Screen Projector

Student from their home for experiments

QuantIm

CDE Lab & Applied Machine Vision Course
“Real” Spectral Imaging Lab
Bringing in Live Lab Session to Students
Student Access to Lab (24/7)

Web Enabled Engineering Laboratories

**Purpose:**

To facilitate student access to state-of-the-art equipment needed for their education.

These laboratories are designed for access by students 24/7 via the web.

The multi-spectral imaging laboratory has been in service since January 2002. Please click on the appropriate link below for a video presentation describing this laboratory (Quicktime version 6 or higher must be installed to view).

- Dial Up (56k)
- Cable Modem
Welcome to BAE Multi-Spectral Imaging Laboratory

To run this program, you need to install Microsoft NetMeeting3.0 click [here](#) to download.

Click the following link to connect to the specific vision station.

PLEASE REMEMBER TO TURN OFF ALL POWER (i.e. the RELAYS) INSIDE QUANTIM WHEN YOU ARE DONE!

ALSO PLEASE DO NOT CLOSE OUT QUANTIM. THANKS!

- Machine Vision 1
- Machine Vision 2
- Research Station 1
- Ocean Optics Spectrometer

When finish, click this button:

[Finish](#)

To see the NetMeeting, click the "Undock" button.

[Undock](#)
Student Access to Lab Equipment
Experimental Instructions (Web page)

There are 3 parts to this spectrometry experiment:

1. Part A is to show how to set up basic data acquisition parameters (with no light). The goal is to show how system noises.
2. Part B to measure reflectance spectra of the MacBeth color chart under a light source called “Reveal” from (this is a common household light bulb in the U.S.A.).
3. Part C to measure reflectance spectra of various features of a replica of a T-bone steak, in preparation for imaging experiments.

In general, as you are remotely controlling equipment located in GA, USA from Kagoshima, Japan, the visual feedback initiated by you will be much slower than usual, so be patient while waiting for the actions of your keyboard or mouse to be confirmed by changes in the window being displayed back to you.

Part A Experimental Procedures

1) Go over the 2 Flash tutorials to learn how to log onto “Weblabs” and for gaining access to the Machine Vision by getting familiar with how to use the “X-Y Axis Move” and “OOIBase32” software applications.

2) Then actually log on to the web site http://weblabs.engr.uga.edu in order to gain access to Machine Vision Student name “XXXXXXXX” and the password “XXXXXXXX” that were given to you by the instructor.

3) Click with the mouse on the title bar of the “xy_axis_move.vi” window, and when it turns blue, you are now in this software application (the mouse cursor changes from an arrow to a hand icon). Make sure that the toggle switch source is turned OFF. The “X-Y Axis Move” window should look like Figure 1.
Narrated “How to” Tutorial
Student Data Collection & Download

ftp://kustudent@weblabs.engr.uga.edu/ - Microsoft Internet Explorer

Server: weblabs.engr.uga.edu
User Name: kustudent

Click here to learn about browsing FTP sites.

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Live Lecture Recording with Silicon Chalk
Conclusions

• We can integrate several hardware and software components together to obtain an instruction engineering system that students can use during class as well as after class.

• With increased and easier access to instructional materials, ones can then hope and perhaps expect that students will learn better.