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E-learning experiences from an engineering school: Virtual labs

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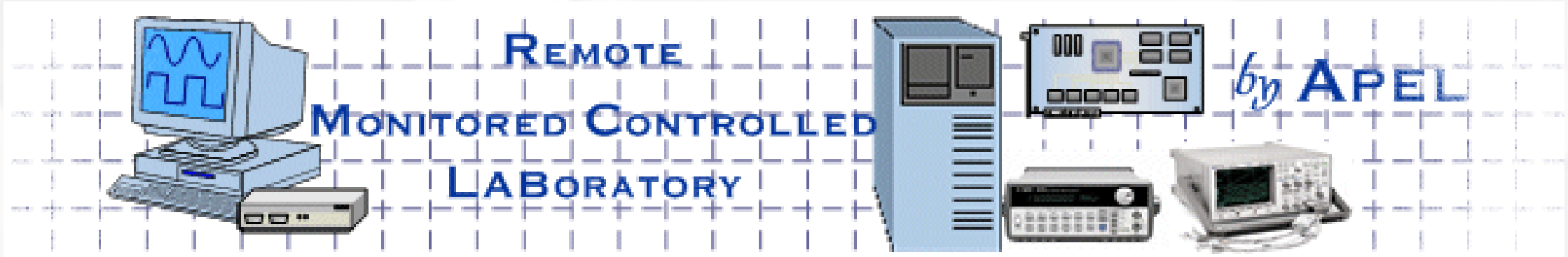
Remote Monitored & Controlled Laboratory

RMCLAB



Dr Giannis Gialelis

Overview

- In universities and high educational institutions the laboratory courses pose **serious constrains** concerning their resources: **equipment and personnel**
- A new approach is needed to provide **remote access to real laboratories** where instruments are available 24 hours a day, 7 days a week, allowing **multiple users** at the **same time** use the resources running their experiment and acquiring their data

RMCLab

- RMCLab model **supports full remote monitor and control** of real laboratory assignments
- RMCLab supports **custom designs** for testing and evaluation with real laboratories instrumentation
- Through this approach valuable experience can be **easily** and **efficiently** carried out

RMCLab Characteristics

- RMCLab is developed in house, implementing a Client-Server architecture
- RMCLab is used for 2-academic courses, Analog and Digital Integrated Circuits in the Department of Electrical & Computer Engineering at the University of Patras
- allows users to **remotely access real laboratory equipment**
- allows teachers to **develop custom experiments**
- **multiple users** can be "active" at the same time, running different experiments

- **high quality instrumentation** can be distributed to multiple users, resulting in an efficient but low-cost laboratory for end-users
- **ease** the manageability for the instrumentation
- introduces remote control of instrumentation (**etraining**)
- utilizes standard network technologies
- RMCLab doesn't demand high rates of data transfers

RMCLab Architecture

- The RMCLab platform comprises tools:
  - Group Manager
  - Scenario Builder
- A typical scenario of an RMCLab-Based experiment contains:
  - images for experiment circuitry and electronic diagrams
  - hardware elements, including
    - input and test points
    - switches to control digital values
    - variable capacitors/inductors/resistors
- text information for the experiment

International similar platforms

- Automated Internet Measurement Laboratory - AIM-Lab (Rensselaer Polytechnic Institute - RPI)
- Next Generation Lab - NGL - Analog CMOS Course (Norwegian University of Science And Technology - NTNU)
- Distance Lab (Blekinge Institute of Technology - BTH)
- Internet Based Remote Control System - IBRCS (Advanced IT Applications and Consultancy - AITAC)
- Internet Lab - ILab (Chalmers University of Technology)
- Internet Shared Instrumentation Laboratory - ISILab (University of Genoa)
- Interactive Systems Laboratory - ISL (University of Illinois - UIC)

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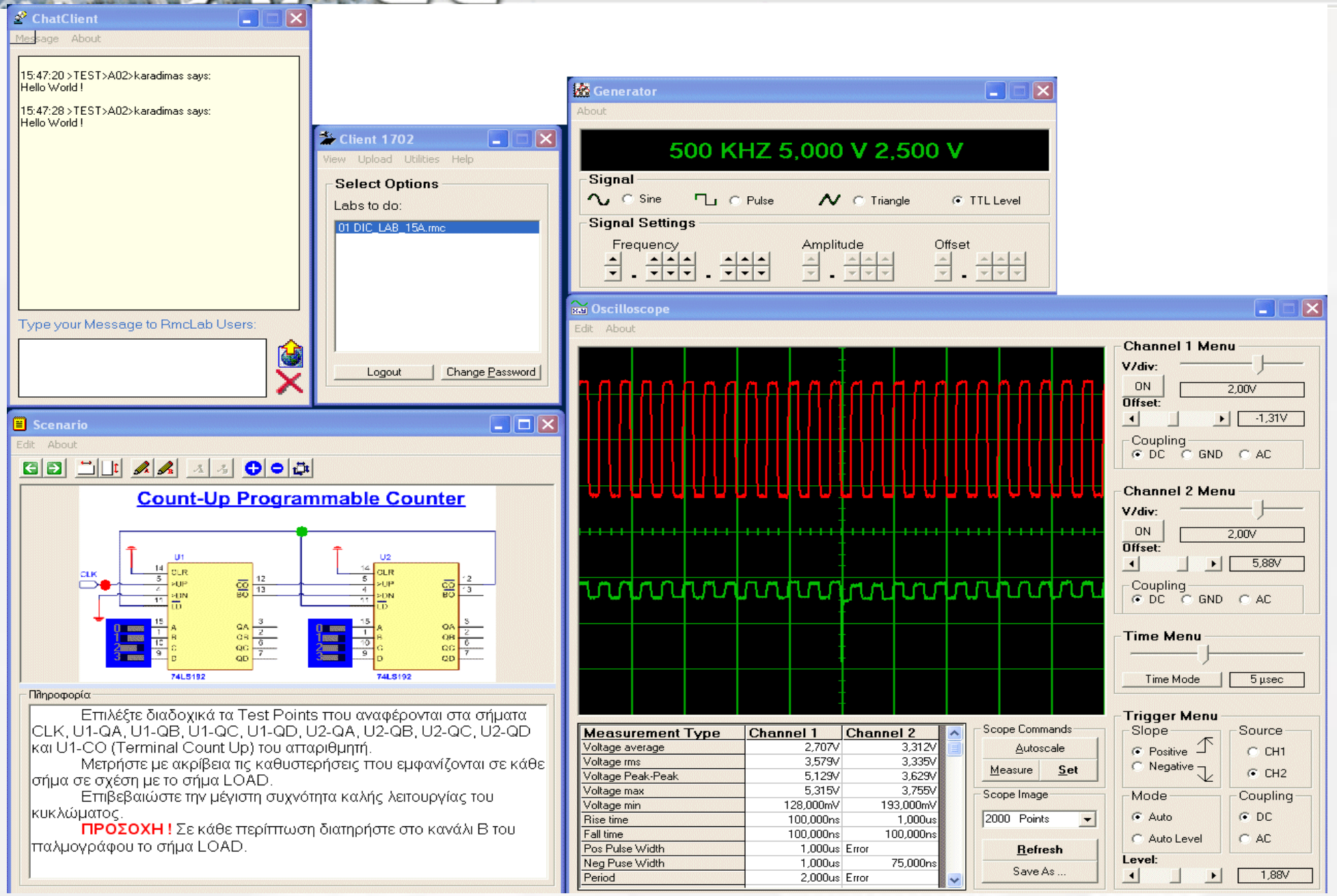
- A Java-Based Remote, Measurement Laboratory - ReMLab (Politecnico di Milano)
- Web-based Educational framework for Analysis, Visualization, and Experimentation - WEAVE (WEAVE Project under DUKE University)
- WebLab (Massachusetts Institute of Technology - MIT)
- Internet Remote Experimentation - VLAB (National University of Singapore - NUS)
- RETWINE (Universidad Autonoma de Madrid - UAM)
- Virtual Laboratory - VirtLab (John Hopkins University - JHU)


ChatClient
Message About
15:47:20 >TEST>A02>karadimas says:
Hello World !
15:47:28 >TEST>A02>karadimas says:
Hello World !
Type your Message to RmcLab Users:
Client 1702
View Upload Utilities Help
Select Options
Labs to do:
01 DIC_LAB_15A.rmc
Logout
Change Password
Generator
About
500 KHZ 5,000 V 2,500 V
Signal
Sine
Pulse
Triangle
TTL Level
Signal Settings
Frequency
Amplitude
Offset
Oscilloscope
Edit About
Channel 1 Menu
V/div:
ON
2,00V
Offset:
-1,31V
Coupling
DC GND AC
Channel 2 Menu
V/div:
ON
2,00V
Offset:
5,88V
Coupling
DC GND AC
Time Menu
Time Mode
5 µsec
Trigger Menu
Slope
Positive
Negative
Source
CH1
CH2
Mode
Auto
Auto Level
Coupling
DC
AC
Level:
1,88V
Scenario
Edit About
Count-Up Programmable Counter
CLK
U1
U2
74LS192
74LS192
Πληροφορία
Επιλέξτε διαδοχικά τα Test Points που αναφέρονται στα σήματα CLK, U1-QA, U1-QB, U1-QC, U1-QD, U2-QA, U2-QB, U2-QC, U2-QD και U1-CO (Terminal Count Up) του απαριθμητή.
Μετρήστε με ακρίβεια τις καθυστερήσεις που εμφανίζονται σε κάθε σήμα σε σχέση με το σήμα LOAD.
Επιβεβαιώστε την μέγιστη συχνότητα καλής λειτουργίας του κυκλώματος.
ΠΡΟΣΟΧΗ ! Σε κάθε περίπτωση διατηρήστε στο κανάλι Β του παλμογράφου το σήμα LOAD.
Measurement Type | Channel 1 | Channel 2
Voltage average | 2,707V | 3,312V
Voltage rms | 3,579V | 3,335V
Voltage Peak-Peak | 5,129V | 3,629V
Voltage max | 5,315V | 3,755V
Voltage min | 128,000mV | 193,000mV
Rise time | 100,000ns | 1,000us
Fall time | 100,000ns | 100,000ns
Pos Pulse Width | 1,000us | Error
Neg Puse Width | 1,000us | 75,000ns
Period | 2,000us | Error
Scope Commands
Autoscale
Measure Set
Scope Image
2000 Points
Refresh
Save As ...

GLAD TO BE HERE!!!