ENHANCE STUDENT LEARNING with REMOTE CONTROLLED EXPERIMENTS

INCREASE YOUR EE/EET LAB CAPACITY BY 10x OR MORE AND COMPLEMENT EXISTING LABS

ONE HARDWARE UNIT FOR 30 OR MORE STUDENTS SIMULTANEOUSLY

UTILIZING EMONA’S FAST, TIME-SHARE TECHNOLOGY

AT HOME

IN CLASS

ANYWHERE

netCIRCUIITlabs - Analog & Digital Electronics Experiments
netTIMS-FreeWire - Modulation & Coding Experiments
REMOTE CONTROLLED EXPERIMENTS - A NEW SOLUTION

A NEW ENGINEERING LABS MODEL

TRADITIONAL
practical experience
with real parts, real signals in realtime

CONVENIENT
on-screen experience
with ideal parts, ideal waveforms, a valuable design tool

Hands-on hardware experiments
Simulation software
Remote controlled experiments

netCIRCUITlabs - A NEW LAB RESOURCE
- 24/7 hands-on experiments
- 30+ users AT THE SAME TIME
- Simple INTERNET BROWSER access and control
- Analog & digital electronic circuits
The netCIRCUITlabs Control Unit, located in your lab or office, and will accept any netCIRCUITlabs Lab Experiment board.

- Fast and easy implementation. No software to install and no setting up required.
- Secure access for professor to all ADMIN functions including student records and tracking.

The experiments boards plugs into the netCIRCUITlabs Control Unit.

EASY BROWSER ACCESS FOR STUDENTS and MANAGEMENT FOR PROFESSORS

- Each student can select and operate the experiment of THEIR CHOICE. All experiments are available to each student.
- Students access experiments via their web browser. No software to download: simple USERNAME and PASSWORD access.
- Professor has web access to the secure Server Administration pages for student set-up, management and monitoring usage.

REALTIME EXPERIMENT CONTROL
LIVE WAVEFORM DISPLAY

netCIRCUITlabs EXPERIMENT BOARDS

APPLICATIONS EXPERIMENTS
- REL 2.0 CIRCUIT THEORY + Lab Manual.
- REL 2.1 TRANSISTOR CIRCUITS + Lab Manual.
- REL 2.2 OP-AMP CIRCUITS + Lab Manual.

REL 3.0 DIGITAL LOGIC + Lab Manual.

CUSTOM CIRCUITS
- REL 1.0 BUILD YOUR OWN CIRCUITS.
REL 2.0 CIRCUIT THEORY Experiments board - student wired experiments

- REL2.0 Circuit Theory plug-in board installed in netCIRCUITlabs Control Unit.

- REL2.0 plug-in board showing breadboard area for professor defined transfer function RLC circuits.

- User patches R, L & C circuits, on-screen, in real time.
- User has access to full function test instrumentations.
- 2 professor defined RLC - H1 and H2 - transfer functions, ideal for student testing.

REL2.0 EXPERIMENT CAPABILITIES
1. Voltage and Current Measurements
2. Series and Parallel Resistance Circuits
3. Ohm’s Law and Series Circuits
4. Parallel Circuits
5. Series-Parallel Circuits
6. Kirchhoff’s Laws
7. Thevenin’s Theorem
8. Power
9. Alternating Current Circuits
10. Capacitors Charge and Discharge
11. RL and RC Circuits
12. Second Order RLC Circuits
13. Two USER DEFINED circuits

REL 2.1 TRANSISTOR CIRCUITS Experiments board - pre-wired experiments

REL2.1 ELECTRONIC CIRCUITS EXPERIMENT CAPABILITIES
1. Voltage divider biasing
2. DC quiescent conditions
3. AC performance of CE BJT
4. Unloaded voltage gain
5. Loaded voltage gain
6. Cascaded amplifiers
7. Max pk-pk output voltage
8. Emitter resistor by-pass voltage
9. Negative feedback
11. SCR operation
12. SCR dimmer
13. OTL amplifier

- Example, RLC circuit - wired on-screen by the student.

- The 2 stage AC amplifier.

- The differential amplifier.
REL 2.2 OP-AMP Experiments board - pre-wired experiments

- Dynamic range & slew rate
- Open loop
- Input offset voltage & current
- Common mode
- Inverting amplifier
- Non-inverting amplifier
- Voltage follower
- Summing amplifier
- Differential amplifier
- The integrator
- The differentiator
- Combined integration & differentiation
- Squarewave generator
- Duty cycle
- Triangle wave generation
- Sawtooth wave generation

REL 3.0 DIGITAL LOGIC board - student wired experiments

- Hi/LO Logic Switches x 8
- 8 bit Binary Counter
- 4 bit Gray Counter
- 4 bit Johnson Counter
- Over 60 gates & Flip-Flops:
  - 2, 3 & 4-input OR gates
  - XOR gates
  - 2, 3 & 4-input AND gates
  - Inverters
  - S/R, D & J/K Flip-Flops
  - Finite State Machines

- Boolean logic and algebra
- Combinatorial circuits
- Truth tables
- Karnaugh Maps
- Quine-McCluskey method
- Designing Synch & Async sequential circuits
- Flip flops
- State diagrams
- Design of FSM
- Registers, Counters, Multiplexers, Encoders etc
- Introduction to HDL (Verilog)

All the logic functions and connections are implemented in an FPGA.

Menu of logic gates and functions.

Menu of logic gates and functions.

Sawtooth waveform generator.

The differentiator and integrator.
REL 1.0 BUILD YOUR OWN CIRCUITS board - custom circuits built by professor

- Build 1, 2, 3 or more custom electronic circuits on the one, large breadboard. Deliver each circuits independently.
- Quick upload of the circuit schematics.
- User controlled components and instruments include: Function Generator, Oscilloscope (4 x 4 channels), Potentiometers, Switches and Digital Logic outputs.

**USER CONTROLLED COMPONENTS INCLUDE:**

1. Large 2,692 point solderless breadboard with distribution strips and component breadboarding area.
2. 8 x POTENTIOMETERS, User remotely controllable:
   - 7 x 10kΩ
   - 1 x 100kΩ
3. 4 x SPST switches, User remotely controllable
4. 4 x SPDT switches, User remotely controllable
5. 16 x Oscilloscope inputs, User remotely controllable:
   - 4 x 4 channels
6. 16 x DIGITAL outputs (HI/LO signals), User remotely controllable
7. Protected triple output DCV power supply: +5V, +12V, -12V

**REL 1.0 BREADBOARD CIRCUITS**

- Electronic circuits implemented on the REL1.0 Breadboard.
- Schematics of electronic circuits implemented on the breadboard are displayed to the user.
- 4 User Controlled blocks are also displayed: Function Generator, Potentiometers, Switches and Digital Outputs.

- User selects the circuit to display and experiment with.
- Selected circuit is displayed.
REMOTE CONTROL OF EXPERIMENTS

- Experiment circuit selection is by pop-up menu
- "PRE-WIRED CIRCUITS" include student controllable switches, potentiometers and test instruments
- "STUDENT WIRED" experiments are patched/wired on-screen by the students in real-time
- Fully self-contained, with inbuilt test instruments including oscilloscope, spectrum analyser, cursor measurements and full-function signal generator.

EXPERIMENT SELECTION

- Mouse click on-screen to open and close switches
- Drag mouse on-screen to vary potentiometer with high-resolution drag mode

OSCILLOSCOPE & SPECTRUM

- 4 channel in-built oscilloscope, plus
  - Spectrum display
  - XY display
  - Waveform Maths, Voltage and Frequency measurement
  - Easy cursor measurement

EXPERIMENT CONTROL

FUNCTION GENERATOR

- Frequency Control
- Amplitude Control
- HI/LO Amplitude Range
- Variable DCV
- Dropdown menu for waveform selection

LIVE WIRING/PATCHING OF CIRCUITS

- Students build experiments by selecting and patching inputs and outputs
Emona netCIRCUITlabs
Real hardware labs, controlled via web browser

A complete lab of experiments on each Applications Board

- Custom Circuits Breadboard
- R, L & C Circuit Theory
- Transistor Circuits
- Op-amp Circuits
- Digital Logic
- and more.....

Available from:

Emona Instruments Pty Ltd
78 Parramatta Road
Camperdown NSW 2050 AUSTRALIA
Tel: +61-2-9519-3933  Fax: +61-2-9550-1378
URL: www.netCIRCUITlabs.com
Email: sales@emona-tims.com