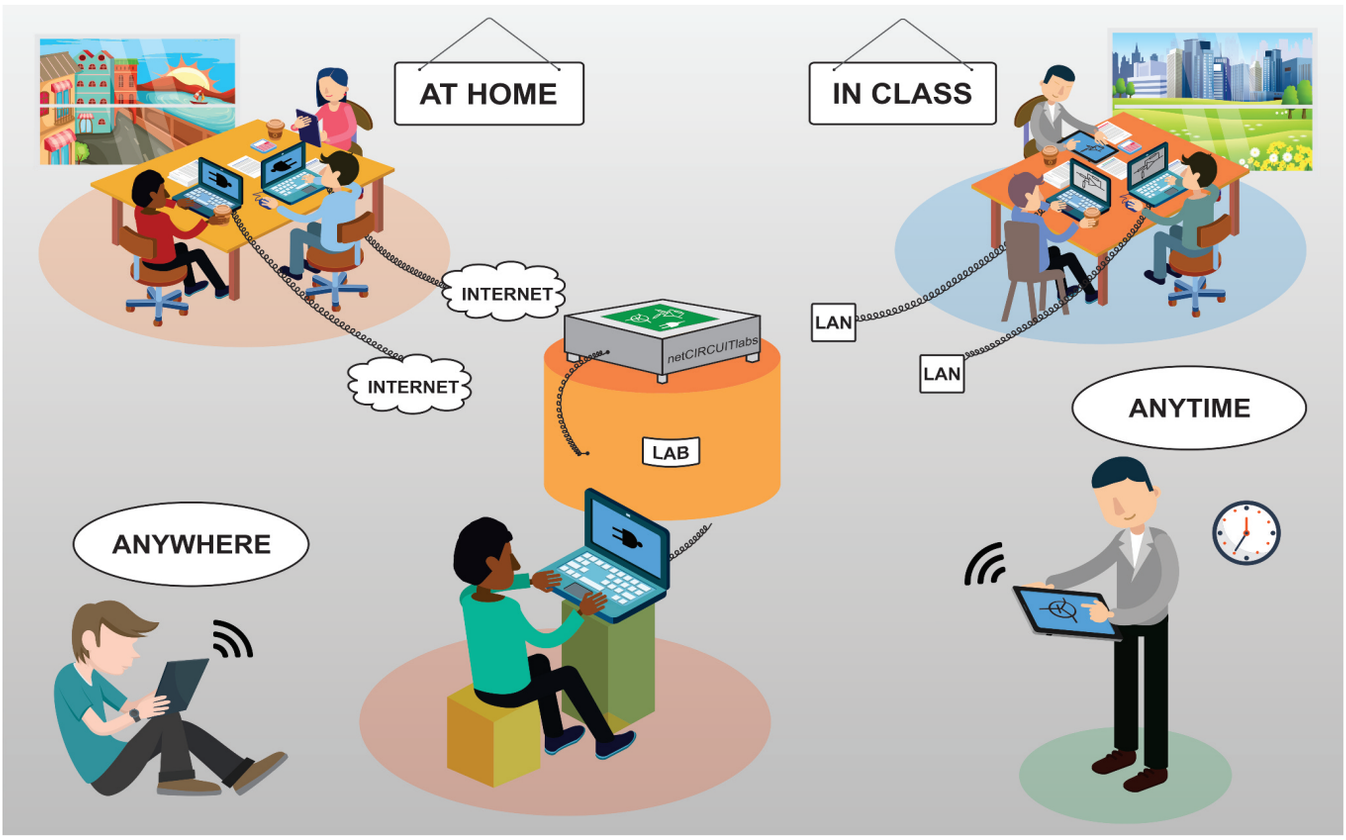
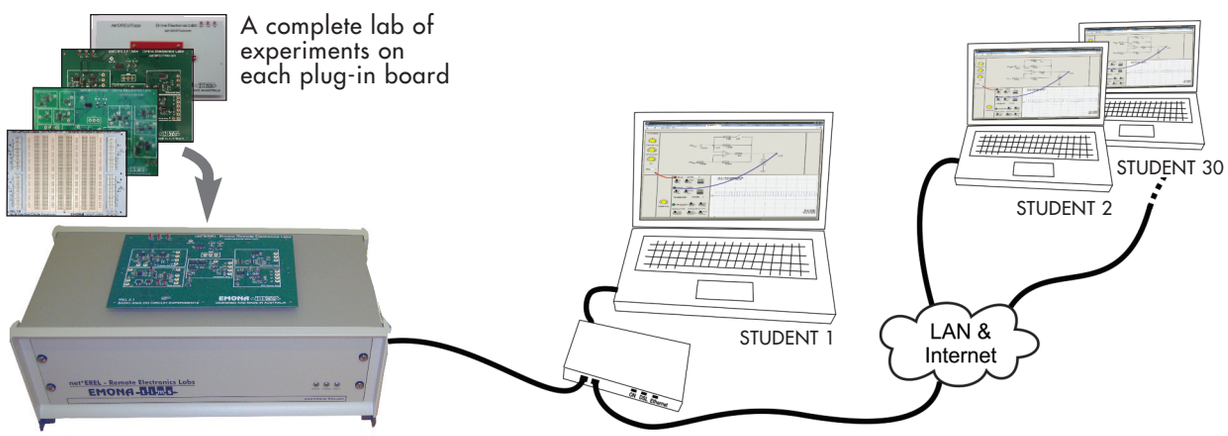
NEW

EMONA netCIRCUITlabs

Remote Access, Multi-User
Electronic Circuits Labs
via LAN & Internet



Real hardware labs, controlled via web browser

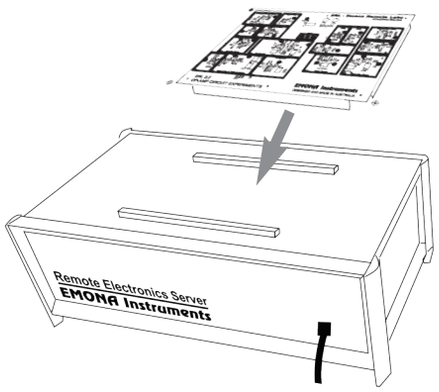


Unpack, power-up and run your own remote lab program in minutes

EMONA Instruments

www.netCIRCUITlabs.com

netCIRCUITlabs CONTROL UNIT with MULTIPLE PLUG-IN BOARDS



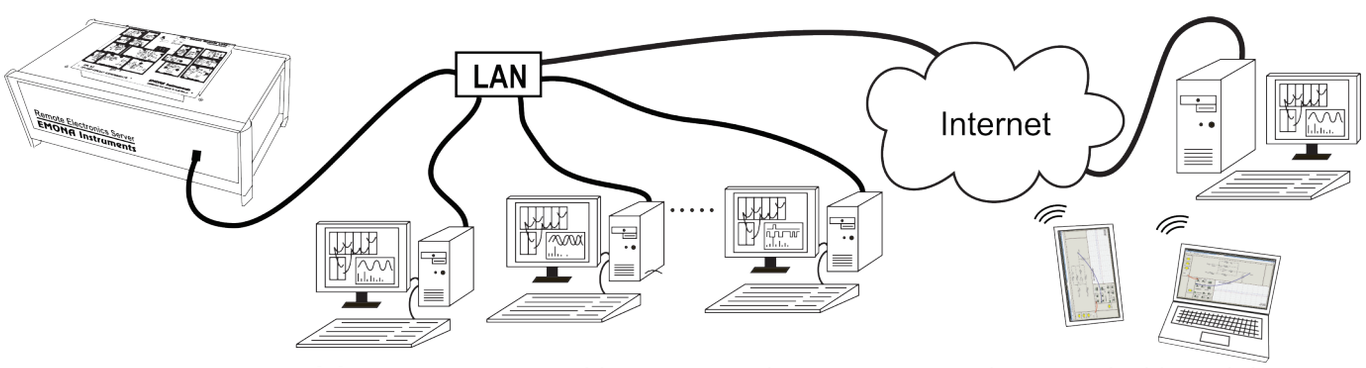
net*CIRCUIT*labs Control Unit connects router, hub or LAN. Lab Experiments board shown not plugged-in.

- The netCIRCUITlabs Control Unit, located in your lab or office, and will accept any netCIRCUITlabs Lab Experiment board.
- One Lab Experiment board can be plugged into the Control Unit at one time.
- Fast and easy implementation. No software to load and no setting up required.
- The Control Unit automatically detects the current experiment board. The Control Unit contains all server and interface requirements, ready to connect by single CAT5 to LAN.

WHY REMOTE LABS?

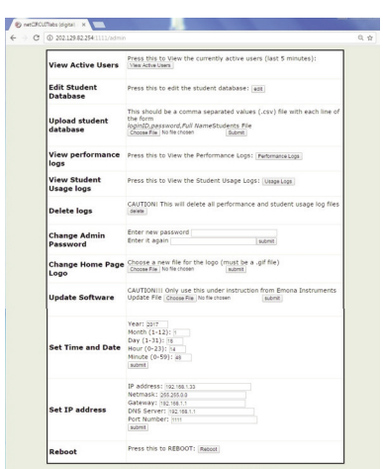
- **Studies show inexperienced students believe hardware more than simulation**
- **The ideal learning path for students: BREADBOARDING > REMOTE HARDWARE > SIMULATION**
  introduction *many topics* *advanced*
- **Eliminates storage issues, maintenance and lab overcrowding**

EASY BROWSER ACCESS FOR STUDENTS and MANAGEMENT FOR PROFESSORS



net*CIRCUIT*labs experiment accessible via LAN and Internet using PC, laptop and tablet web browser.

- At least 30 students can SIMULTANEOUSLY access the netCIRCUITlabs Control Unit. Experiments are available 24 hours a day, 7 days a week.
- Each student can select and operate the experiment of THEIR CHOICE. All experiments are available to each and every student.
- Students instantly access experiments via their web browser. There is no software to load: only USERNAME and PASSWORD is required.
- Professor has instant web access to the secure Server Administration pages for simple student set-up, management and monitoring usage.
- Easy to integrate into existing CMS.

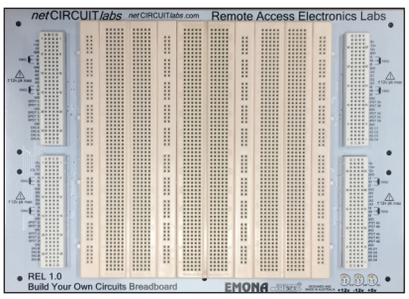


The professor's administration page

netCIRCUITlabs EXPERIMENT BOARDS

REL 1.0 Build Your Own Circuits plug-in board

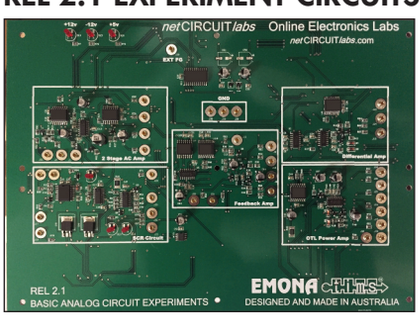
REL 1.0 BUILD YOUR OWN CIRCUITS BREADBOARD



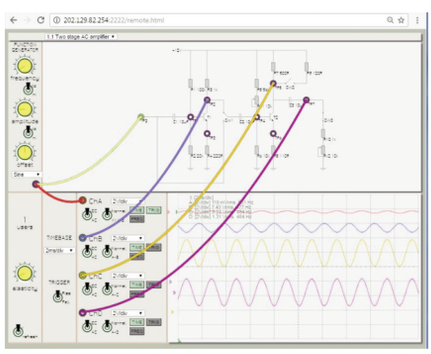
1. *Large 2,692 point solderless breadboard with distribution strips and component breadboading area.*
2. *User remotely controllable potentiometers: 7 x 10kR; 1 x 100kR*
3. *User remotely controllable SPST switches: x 4*
4. *User remotely controllable SPDT switches: x 4*
5. *User remotely controllable oscilloscope multiplexer inputs: 4 x 4 channels*
6. *User remotely controllable digital outputs (HI/LO signals): 16 outputs*
7. *Protected DCV power supply: +5V, +12V, -12V*

REL 2.1 Basic Analog Circuit Experiments Lab plug-in board

REL 2.1 EXPERIMENT CIRCUITS



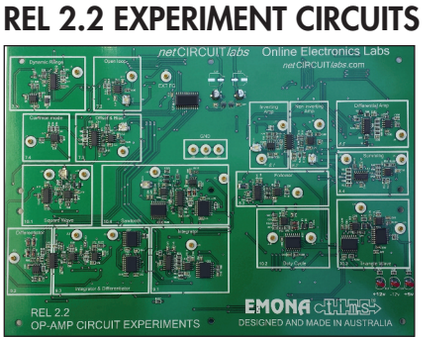
1. *Voltage divider biasing*
2. *DC quiescent conditions*
3. *AC performance of CE BJT*
4. *Unloaded voltage gain*
5. *Loaded voltage gain*
6. *Cascaded amplifiers*
7. *Max pk-pk output voltage*
8. *Emitter resistor by-pass voltage*
9. *Negative feedback*
10. *Differential amplifier*
11. *SCR operation*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



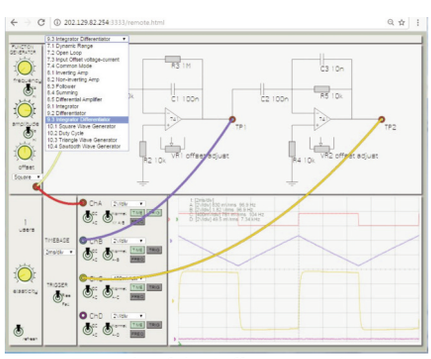
Example of the 2 Stage AC Amplifier

REL 2.2 Op-amp Circuit Experiments Lab plug-in board

REL 2.2 EXPERIMENT CIRCUITS



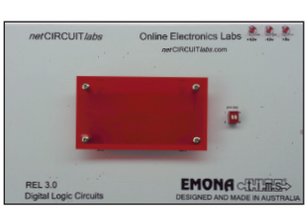
1. *Dynamic range & slew rate*
2. *Open loop*
3. *Input offset voltage & current*
4. *Common mode*
5. *Inverting amplifier*
6. *Non-inverting amplifier*
7. *Voltage follower*
8. *Summing amplifier*
9. *Differential amplifier*
10. *The intergrator*
11. *The differentor*
12. *Combined integration & differentiation*
13. *Squarewave generator*
14. *Duty cycle*
15. *Triangle wave generation*
16. *Sawtooth wave generation*



Example of the Differentiator/Integrator

REL 3.0 Combinational & Sequential Logic Lab Experiments plug-in board

REL 3.0 LOGIC FUNCTIONS - students patch together real logic elements on-screen, in real time

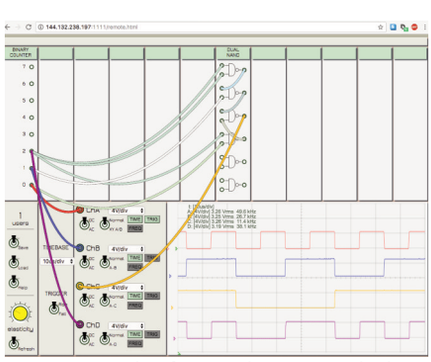


All the logic functions and connections are implemented in an FPGA.

SIGNAL SOURCES:
- *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
X-OR gates
2, 3 & 4-input AND gates
Inverters
S/R, D & J/K Flip-Flops, Inverters
Finite State Machines

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

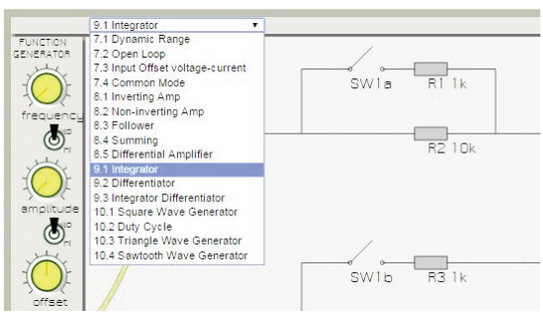


Example of a wired 2 input Multiplexer

REMOTE CONTROL OF EXPERIMENTS

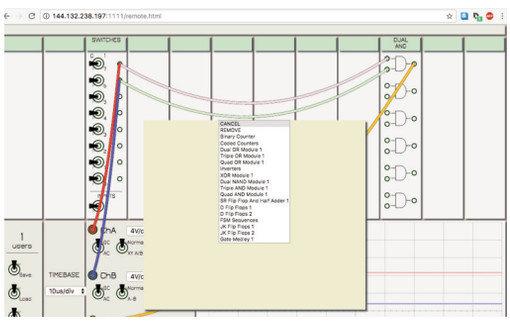
- Analog experiment selection is by drop down menu
- Analog circuits include student controllable switches and potentiometers
- Digital logic experiments are patched together from a selection of independent gates
- Fully self contained, with inbuilt test instruments including oscilloscope, spectrum analyser, cursor measurements and full function signal generator.
- Load and Save Digital Logic Experiment wiring

ANALOG EXPERIMENT SELECTION



Dropdown menu for experiment selection

DIGITAL LOGIC LIVE PATCHING



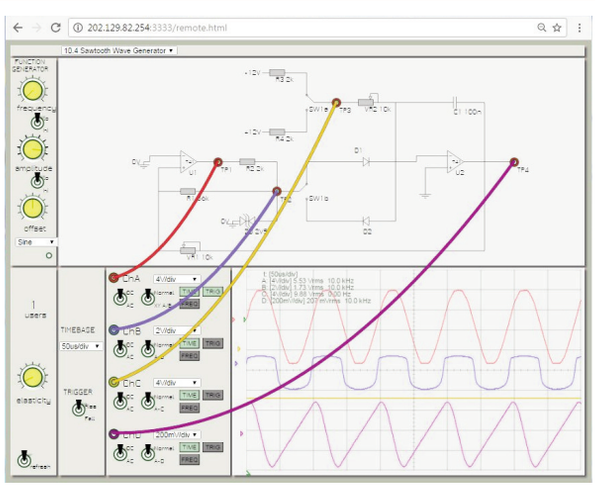
Students build digital logic experiments by selecting and patching real logic gates and functions. Over 60 independent elements are provided.

EXPERIMENT CONTROL

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**

FUNCTION GENERATOR

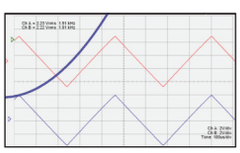
Frequency Control

Amplitude Control

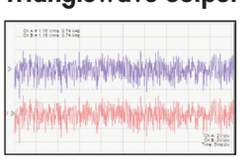
HI/LO Amplitude Range

Variable DCV

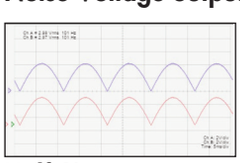
Dropdown menu for waveform selection



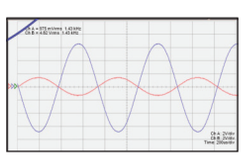
Trianglewave output



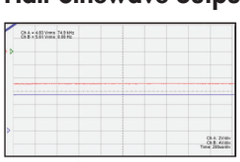
Noise Voltage output



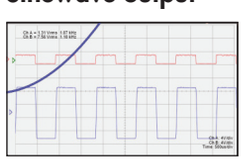
Half Sinewave output



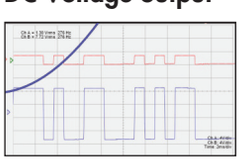
Sinewave output



DC Voltage output



Squarewave output



PN sequence output

Available from:

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