TINA

THE COMPLETE ELECTRONICS LAB

Design Suite

Run Online on all Platforms or Download & Install on Your Computer

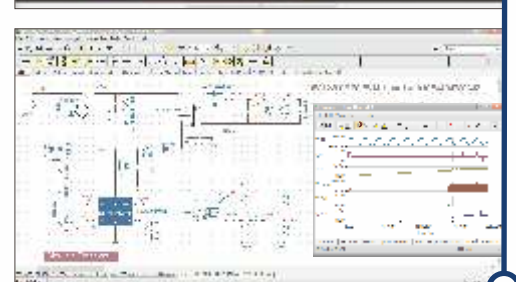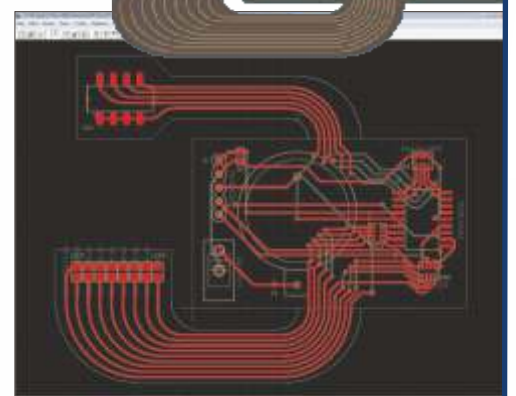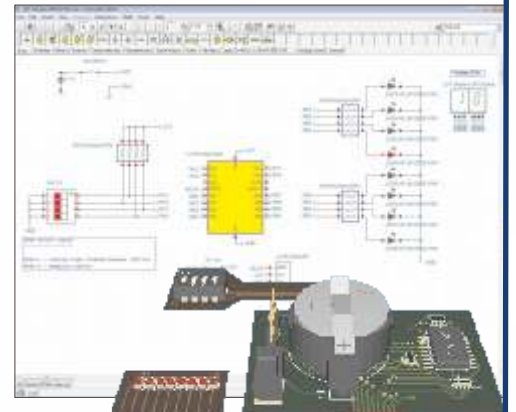Analog, RF, Digital, MCU, HDL, Symbolic, Mixed Signal Circuit Analysis

Built-in Artificial Intelligence Tools

Integrated PCB Layout Design with Animated 3D View

Multimedia Parts, Advanced Diagrams, Virtual Instruments

SPICE, IBIS, S-parameter, VHDL, Verilog, Verilog-A, SystemC & MCU Models
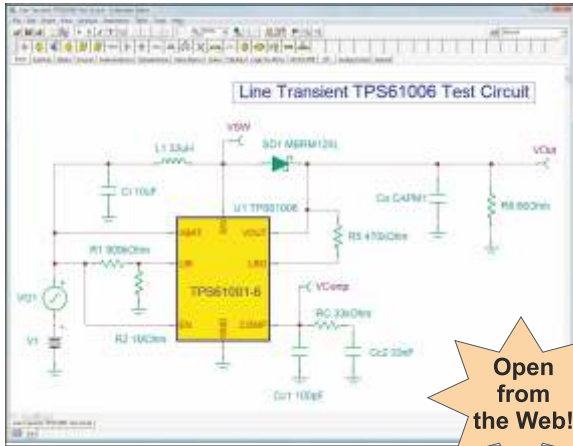
Mechatronics Simulation

DesignSoft

Editing & Presentation Tools

Schematic Editor

Schematic-, Netlist-, and Symbol Editor

Circuits are entered with TINA's easy to use schematic editor. Standard Windows editing commands, including unlimited Undo and Redo, make it easy to create schematics of virtually any size. You can check schematics for errors with TINA's advanced ERC functions. The schematic editor supports text and equation editing, complex hierarchical designs, design by teams, and version control. You can export your design to popular PCB packages and extract a Bill of Materials. With the integrated Schematic Symbol Editor, you can modify or create any component shape. You can also analyze Spice format netlists via the Netlist Editor.Now you can open TINA designs, models and libraries as well as Import Spice .CIR and .LIB files directly from the Web, open EDIF files and import schematics from other EDA vendors.

Open from the Web!

TINA Cloud

is the cloud based version of TINA, running in your browser. With this powerful, industrial strength, yet affordable circuit simulation tool you can analyze and design analog, digital, Verilog, VerilogA & AMS, VHDL, SystemC, MCU, and mixed electronic circuits and their PCB layout. You can also analyse SMPS, RF, communication, and optoelectronic circuits and test microcontroller applications in a mixed circuit environment. TINACloud runs on most OS and computers, including PCs, Macs, thin clients, tablets --even smart phones, smart TVs and many e-book readers. You can use TINACloud in the classroom, at home, and, in fact, anywhere in the world that has internet access. Electrical engineers will find TINACloud an easy to use, high performance tool, while educators will welcome its unique features for the training environment and distance education.

TINA CLOUD
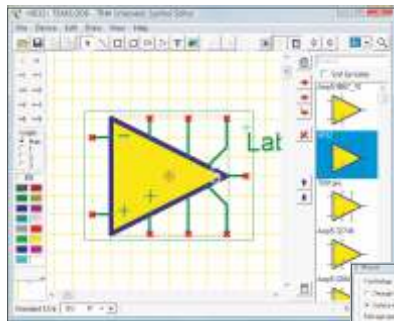
Symbol Editor

Schematic Symbol and Footprint Editor

Using TINA's Schematic Symbol Editor, you can create new schematic symbols and add them to your library of circuit components. When creating new symbols, you have a full set of tools with which to place lines, arcs, rectangles, and arbitrary characters.

You may select the font, line width, color, and area color fills. After drawing the symbol, add and define its external connections (pins). Using the Footprint Editor, you can create new footprint symbols to add to the footprint library. When faced with creating a complex multi-pin device (more and more common these days) and its footprint, TINA's IC Wizard can assist you.


IC Wizard

Macros and user defined components

You can create new TINA components from any Spice subcircuit, VHDL component, S-parameter table, or schematics whether created by yourself, downloaded from the Internet, or obtained from a manufacturer's CD. TINA's intelligent Library Manager will convert most available data automatically to TINA subcircuits. TINA automatically represents these subcircuits as a rectangular block, but you can create any shape you like with TINA's Schematic Symbol Editor. You can also use TINA's parameter extractor program to calculate model parameters from catalog or measurement data and then add the new devices to the catalog.
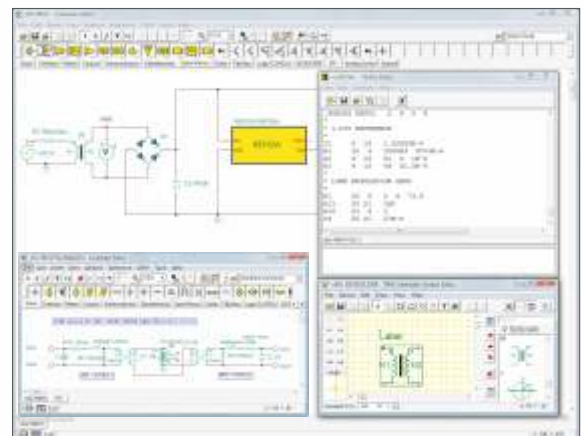

User Defined Components

TINA makes it easy to create annotated schematics, 3D circuits, subcircuits, flowcharts, graphs, equations, and netlists that get your message across clearly and professionally.

Live 3D Breadboard view

Using the Live 3D Breadboard tool in TINA, you can automatically build a life-like 3D picture of a solderless breadboard. When you run TINA in interactive mode, components like switches, LEDs, instruments, etc. become "live" and will work on the virtual breadboard just as in reality. You can use this capability of TINA to prepare and document lab experiments. You can either assemble the circuit step-by-step or by generating the whole circuit on the breadboard. Pick up and move parts on the breadboard using the mouse, and TINA will automatically rearrange the wiring while retaining connectivity.
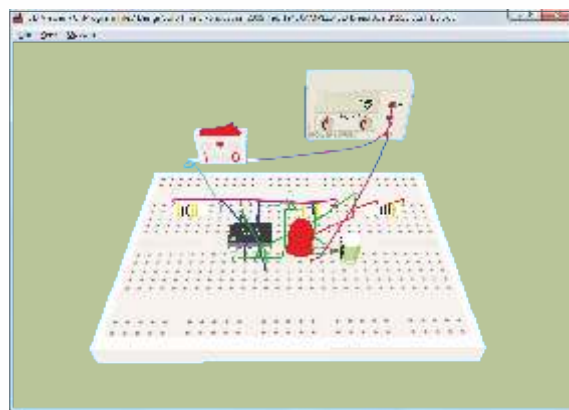

3D breadboard with animated LEDs
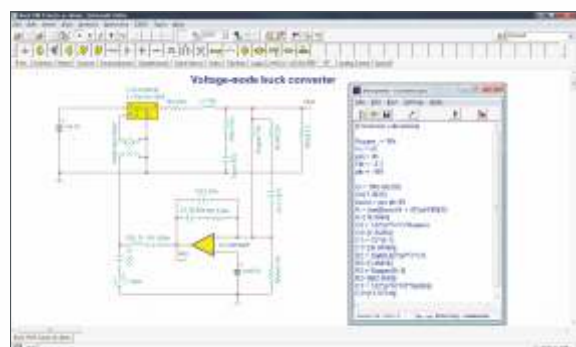
Component Parameter Calculation with the Interpeter

Interpreter

Another powerful feature of TINA is its interpreter. Using a text editor, you can enter arbitrary functions and solve systems of linear equations or evaluate integrals. The interpreter can also process and draw previous results and reference component parameters. Another use for TINA's interpreter is to define arbitrary analog and digital waveforms. You can also use the Interpreter to calculate and set component parameters. Finally, with the interpreter students can solve problems, simply working with the related component's name and intermediate quantities created with the interpreter.

Flowchart Editor and Debugger

Writing MCU assembly code is often a hard and tedious task. You can simplify software development and gain more time to design the electronics hardware if, instead of manual coding, you use TINA's Flowchart editor and debugger. This will generate the MCU code, using just symbols and flow control lines. You then run and debug this code in a digital or mixed signal environment.
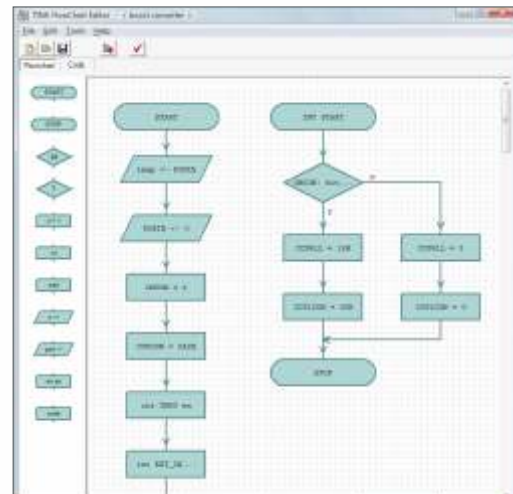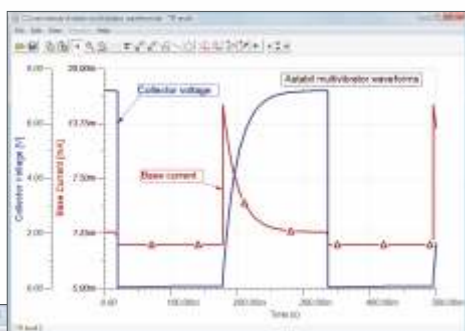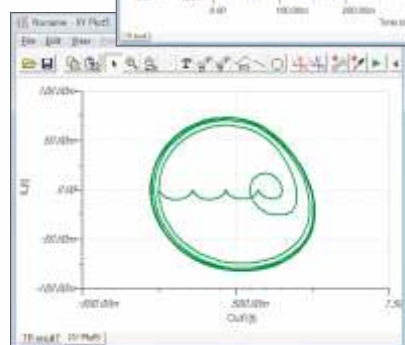

Flowchart Editor

Diagram Window

Trajectory Drawing

Sophisticated Diagram Tool with Post-processor

With TINA you can make quality documents incorporating Bode plots, Nyquist, polar and Smith diagrams, transient responses, digital waveforms, and other data using linear or logarithmic scales. Customize presentations using TINA's advanced drawing tools you can print your plots directly from TINA, cut and paste them into your favorite word processing package, or export them to popular standard formats. Customization includes complete control over fonts, texts and lines along with automatic or manual scaling for each axis.
With the Post-processor you can add new curves of virtually any node, component voltage or currents. In addition, you can process existing curves by applying mathematical functions or draw trajectories, i.e., draw any voltage or current as a function of another voltage or current.

Analog, Digital, VHDL, Verilog, SystemC, MCU, Symbolic Mixed-mode & Interactive Simulation
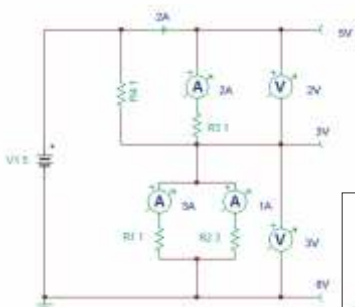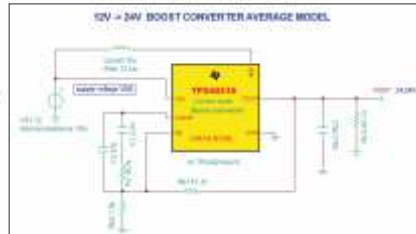

DC Analysis

DC Analysis

DC analysis calculates the DC operating point and the transfer characteristic of analog circuits. You can display the calculated nodal voltages or component currents in a table or at any node by selecting the node with the cursor.

Powerful methods (source- and Gmin stepping, adaptive voltage and step-size limiting) are implemented to find the operating point even for strongly nonlinear cases with hard convergence properties. You can also calculate and display in a diagram the temperature dependence of any voltages or currents in your circuit.
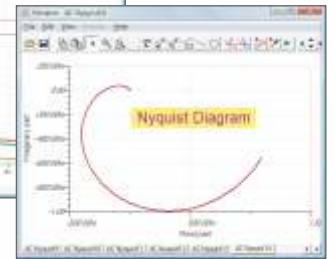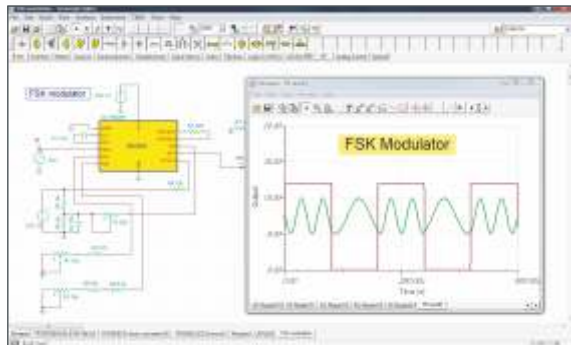
AC Analysis

AC analysis calculates RMS amplitude and phase of voltages and currents in your circuit and the complex power of selected parts. You can display the calculated complex nodal voltages or component currents in a table or at any node by selecting the node, part, or instrument with the cursor. In addition, Nyquist and Bode diagrams of amplitude & phase and group delay characteristics of analog circuits can be plotted You can also get the complex Phasor diagram. For non-linear circuits, the operating point linearization is done automatically.
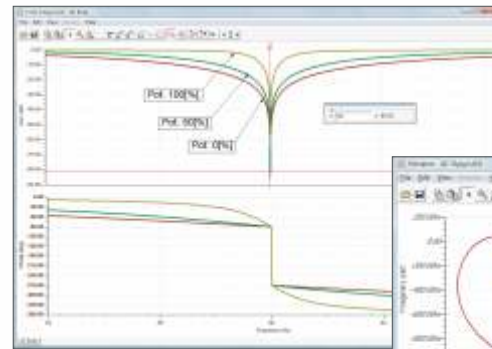
Bode Plot

Nyquist Diagram

Transient Analysis

Transient Analysis

In the transient and mixed mode of TINA, you can calculate the circuit time response to the input waveform, including pulse, unit step, sinusoid, triangle, square, general trapezoidal waveform, Spice PWL table, .WAV files and user-defined excitation) parameterized as required. You can also use components with initial conditions to accelerate circuit startup. Power dissipation and efficiency calculations are also included.

Digital and HDL Simulation

Digital Simulation
TINA includes a very fast and powerful simulator for digital circuits. You can trace circuit operation step-by- step, forward and backward, or view the complete time diagram in a special logic analyzer window. In addition to logic gates, there are ICs and other digital parts from TINA's large component library.

HDL Simulation
TINA also supports VHDL, Verilog, Verilog-A, Verilog-AMS, SystemC simulation to verify HDL designs both in digital and mixed-signal analog-digital environments. You can edit the HDL source of any HDL component and see the result instantly. With the optional external HDL simulator, you can develop and debug your VHDL or Verilog code both externally and inside TINA. The HDL simulator includes Waveform Display, Project Management and Hierarchy Browser. TINA VHDL implementation supports the IEEE 1076-87 and 1076-93 language standards, 1164-93 Standard Logic, Vital, Simprim and Unisim. TINA Verilog implementation supports the IEEE 1364-2001 standard.
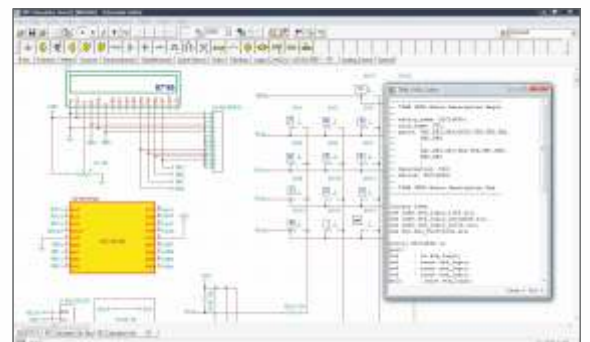

VHDL Analysis

A comprehensive suite of analysis tools equip you
to solve a wide range of analog and digital circuits

Microcontroller Support

TINA includes a wide range of microcontrollers (PIC, AVR, ARM, XMC, 8051, Arduino) which you can test, debug and run interactively. TINA's integrated MCU assembler and debugger allows you to modify or debug your code and see the result promptly. You can also debug your code using TINA's flowchart tool following the code execution block-by-block. You can also use a binary (HEX) code and debug (LST) file made by any standard compiler e.g. with MPLAB for PICs.
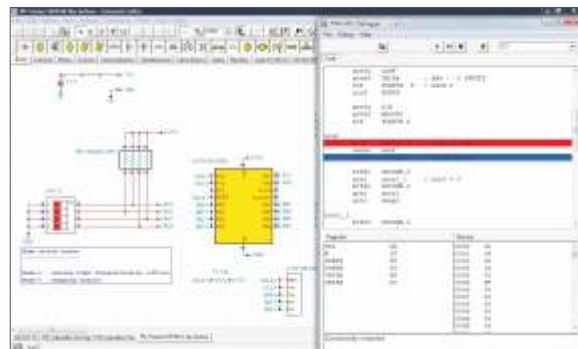
MCU Circuit & Debugger
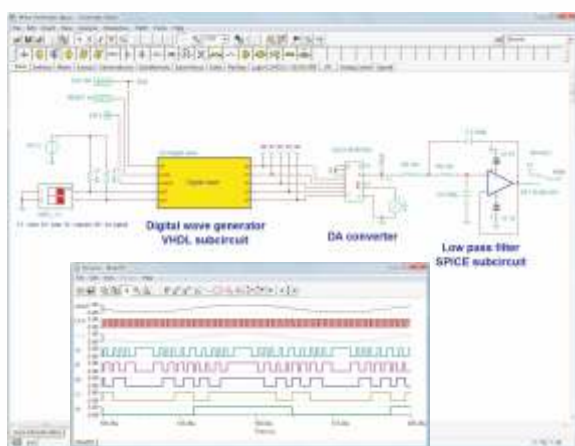
Mixed mode simulation

TINA also includes a powerful mixed mode simulation engine. It is based on the XSPICE mixed mode algorithm, extended with MCU and VHDL components. In your circuits you may freely mix any analog or digital components of TINA, including microcontrollers (MCUs) and macros with Spice or VHDL content. You can modify these components on the fly along with the code in the MCUs. TINA will analyze the analog parts in analog, the digital parts in digital, and will automatically create the interfaces among the components. This ensures synchronization and fast convergence.

Mixed mode simulation

Interactive mode

The ultimate test of your circuit is to try it in a "real life" situation using its interactive controls (such as keypads and switches) and watching its displays or other indicators. You can carry out such a test using *TINA's* interactive mode. Not only can you play with the controls, but you can also change component values and even add or delete components while the analysis is in progress. The interactive mode is also very useful for educational and demonstration purposes, for tuning circuits interactively, and for interactive circuits which you cannot test otherwise, e.g., circuits with switches, relays, or microcontrollers.
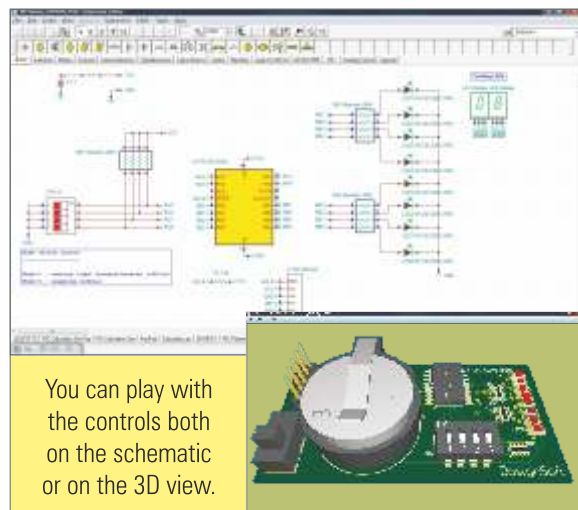
You can play with the controls both on the schematic or on the 3D view.

Interactive mode
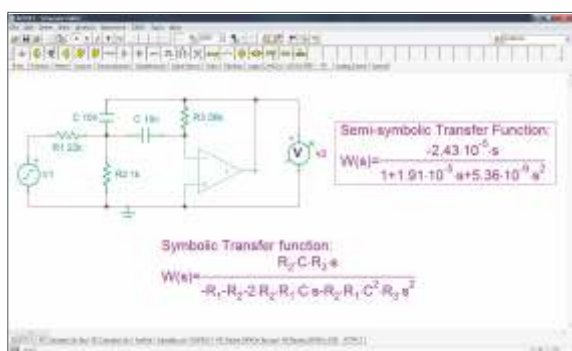
Symbolic Analysis

Symbolic analysis produces the closed form expression of the transfer function, equivalent resistance, impedance, or response of analog linear networks. In DC and AC analysis mode, TINA derives formulas in full-symbolic or semi-symbolic form. In transient analysis, the response is determined as a function of time. Circuit variables can be referenced either as symbolic names or by value on a component-by-component basis. Through symbolic analysis, poles and zeros of linear circuits can be calculated and plotted. You can efficiently prepare classroom or textbook materials by printing or by copying and pasting your expressions to any Windows program.

Symbolic Analysis

Microcontrollers

TINA includes a wide range of microcontrollers which you can run and debug in digital or mixed circuit environment

MCU Simulation and Debugging

You can test, debug and run interactively digital and mixed analog-digital circuits containing PIC, AVR, 8085 and ARM microcontrollers. You can debug and follow the code execution step-by-step in HEX, ASM and C, as well as using TINA's code generating flowchart tool block-by-block.
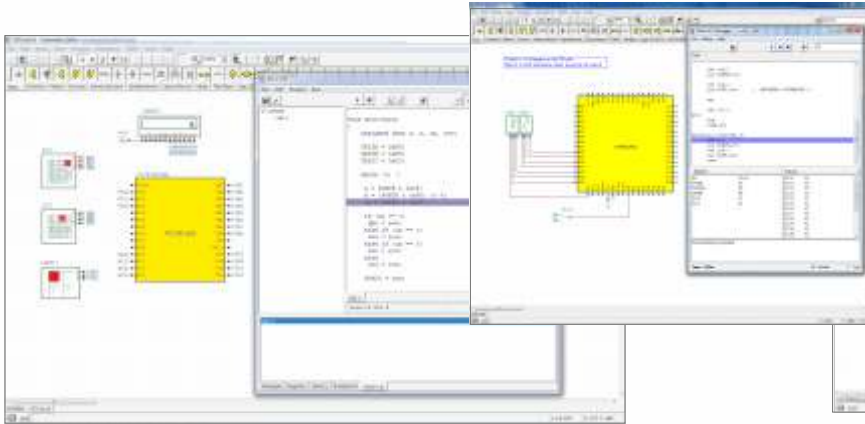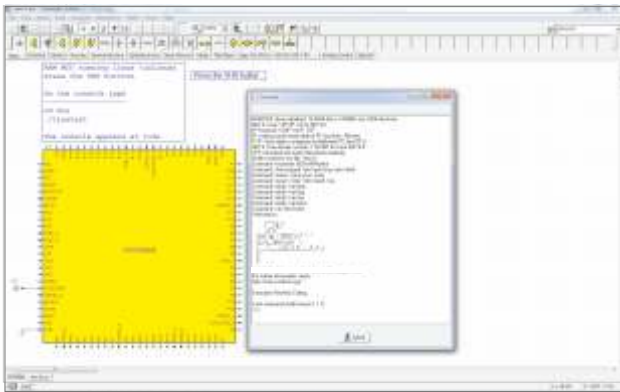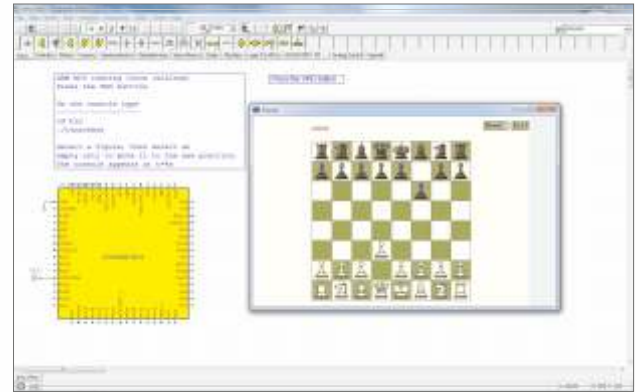

Debugging in C and ASM
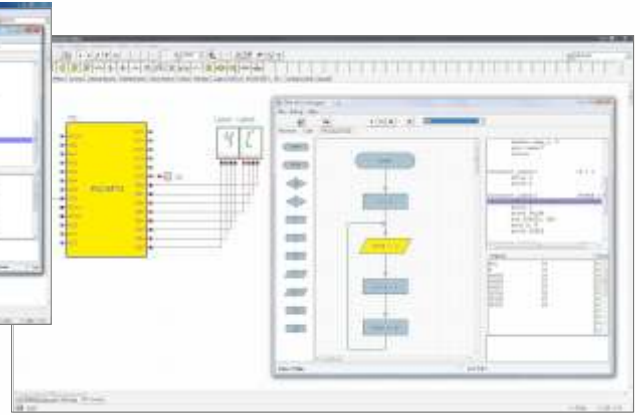
Debugging in ASM and Flowchart

Linux and Android Simulation

You can even run Linux and Android OS in the ARM processors included in TINA and then create and check complete designs before actual hardware is produced.

Linux Simulation using ARM MCU

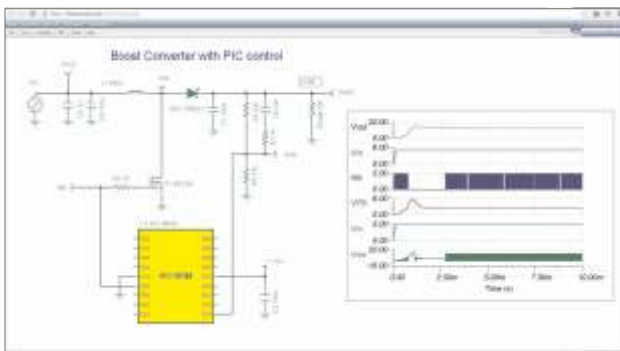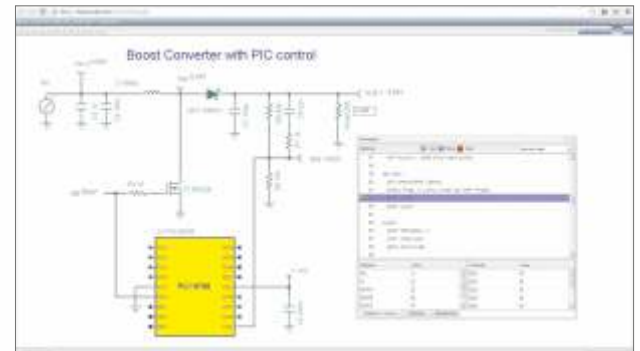Chess program running in Linux

Mixed Spice-MCU Simulation and Debugging

The mixed mode simulator of TINA not only allows MCUs, but also any linear or nonlinear parts from TINA's libraries. This example, realizes a DC-DC converter, converting 5V DC to 13V DC, and operating in boost mode.

Boost Converter with PIC Control Simulation

Boost Converter with PIC control Simulation and Debugging

Mechatronics

In TINA 10 and later versions you can create and simulate multidisciplinary designs currently including electronics, 3D mechanics and control engineering, opening a new wide field of applications in automotive engineering, sensing and control, automation, robotics and more.

Sensing and Controlling

You can place light sources, light sensors, motors and actuators in the mechanical window of TINA and connect with their counterparts in analog, digital mixed electronic circuits. In the educational example on the left the swings of a mechanical pendulum are counted using a LED, Photodiode and a microcontroller circuit. The figure on the right shows the dialog where you can connect the electric and mechanical windows of TINA.

3D mechanical pendulum
and counting circuit

Electric and Mechanical
Windows of TINA

Couplings setup between electronics and mechanics
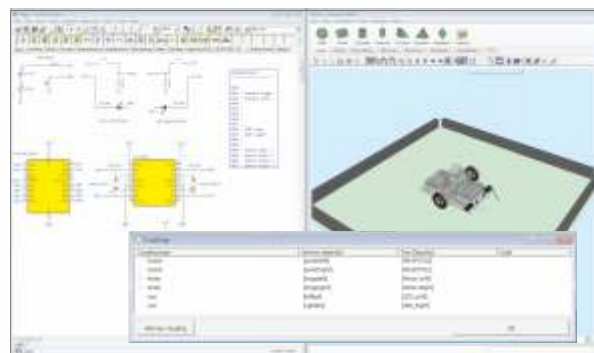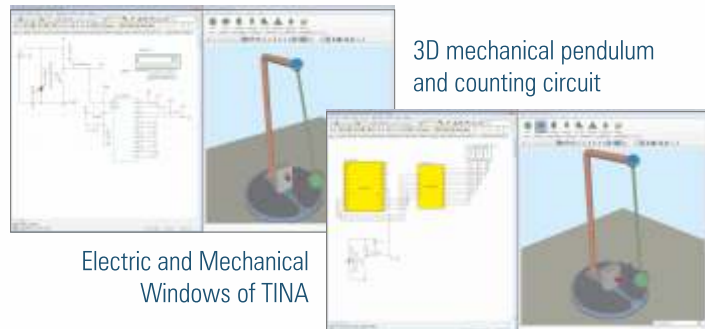
Robotics

You can control the mechanics from the electronics part of TINA even with complex software written in C or assembly language, then compile and execute the code in MCUs while running the electronic and 3D mechanical simulation simultaneously. TINA contains complete examples of line follower and maze solving robots using infrared LEDs and photo diodes for detecting the black and white surfaces below, or walls on both sides and in front of the robot.

Maze solving robot: Controlling electronic circuit and 3D mechanical simulation

Photo of the actual robot in the Maze
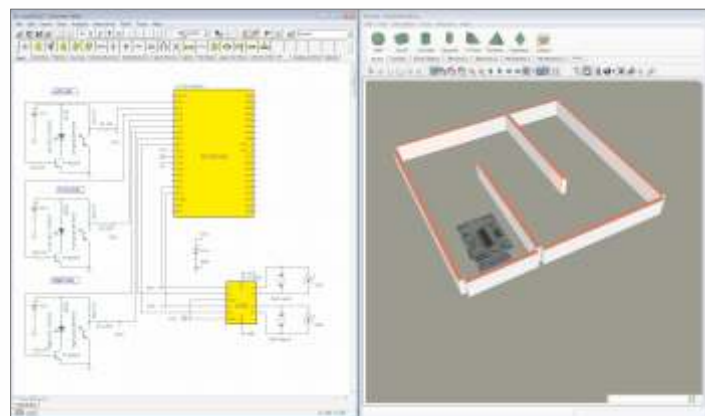
Automotive Electronics

Automotive electronics play an important role in modern automotive control systems responsible for the brake, throttle and steering controls, lighting systems and much more. Using the mechatronics simulation capabilities of TINA 10 and later versions you can simulate and visualize these systems including both electrical and mechanical aspects.

Anti-lock braking system (ABS) simulation

Normalized Relative Slip   Vehicle and Wheel speed
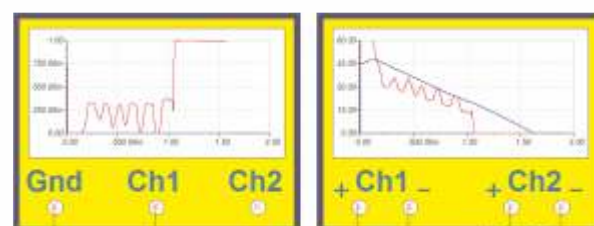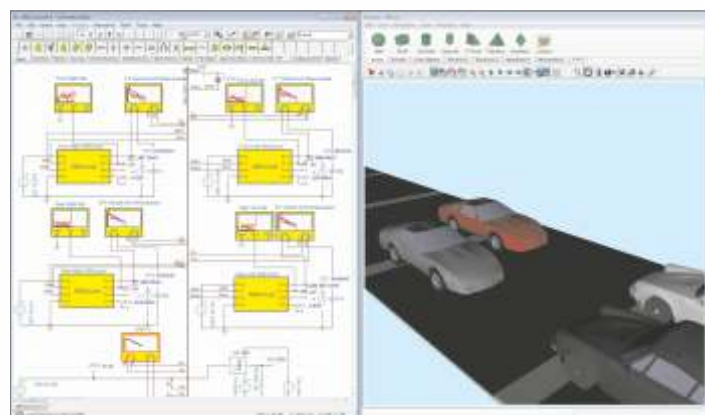
Diagrams of slip, vehicle and wheel speed during heavy breaking

Simulated Measurement with Virtual Instruments

You can work in a simulated electronics lab using a wide range of powerful, virtual instruments. Unlike lab instruments, however, these circuit simulation driven instruments cost nothing and require no maintenance

Digital Multimeter

Measure DC and AC voltage and current, resistance, and frequency with TINA's Digital Multimeter. You can use the multimeter in manual or in autoranging mode.

Function Generator

Generate sinusoidal, square, triangular and arbitrary waveforms at virtually any frequency. The powerful sweep mode lets you choose start/stop frequencies, step size, step time, and single or continuous sweeps.

Storage Oscilloscope
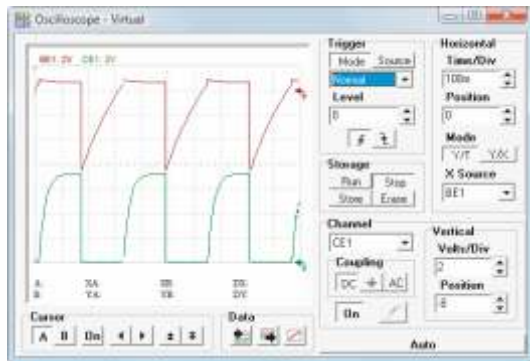
Display analog waveforms with TINA's multichannel analog Storage Oscilloscope. You can select external or internal triggering and a variety of trigger modes. You can also move graphics cursors to accurately measure voltage and time.

## Signal and Network Analyzer
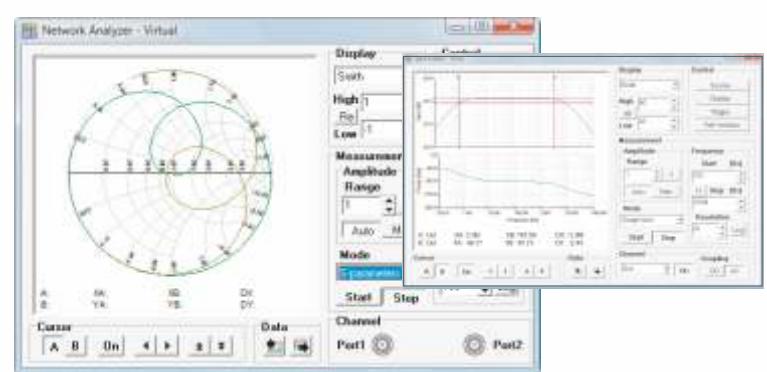
The signal analyzer measures and displays Bode amplitude and phase diagrams, Nyquist diagrams, Fourier Spectrum, and more. The Network Analyzer is similar to the Signal analyzer, but measures S, Z, Y and H parameters, displaying the results as Smith, Polar, or other diagrams.

Digital Signal Generator
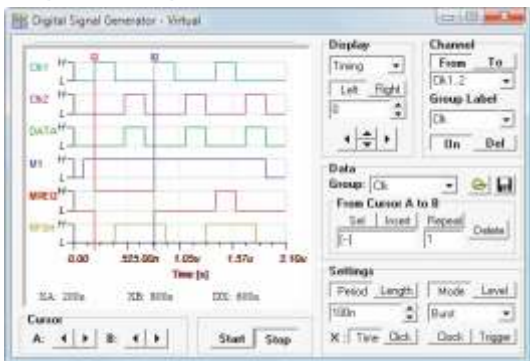
Use the Digital Signal Generator to create any number of arbitrary digital signals to serve as stimuli for your logic circuit. Set up timing patterns effortlessly using the built in editor with insert, repeat, and delete functions as well as graphics cursor editing.

Logic Analyzer
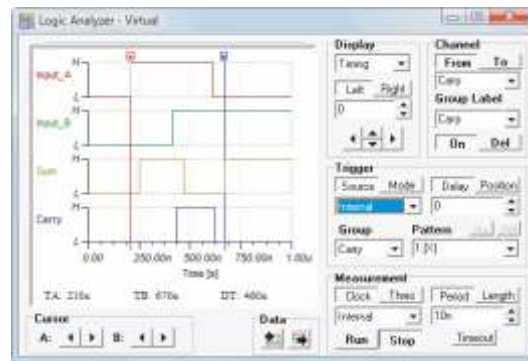
Debug your digital circuit with the advanced Logic Analyzer. Select any number of channels and arrange them into groups for easier viewing. You can also define trigger patterns so that the analyzer will capture a critical data segment.
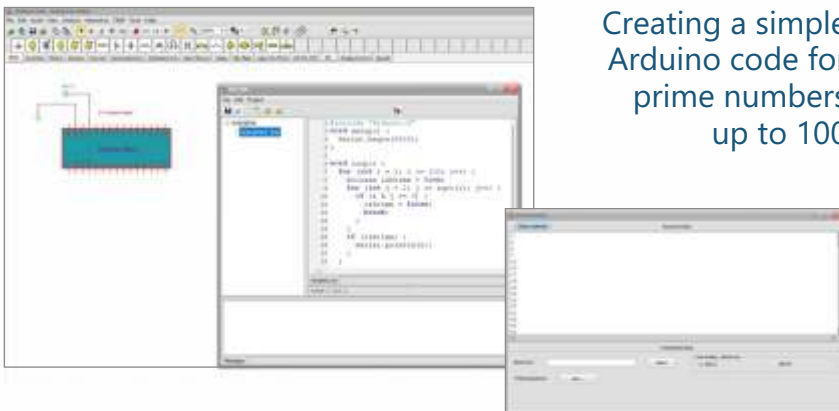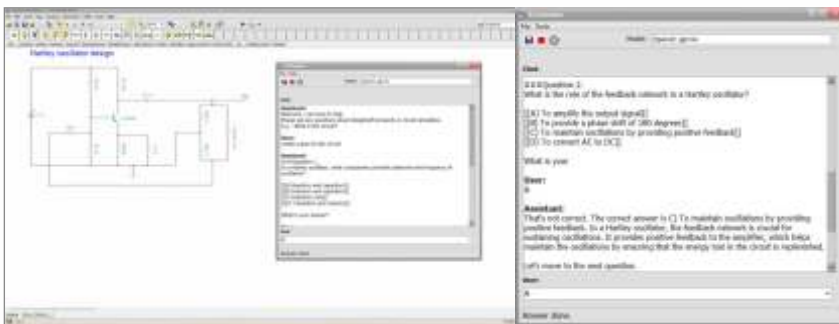
AI Tools in TINA

AI tools in TINA and TINACloud offer a flexible, user-friendly interface for various engineering tasks, including circuit design, simulation, code generation, and education

The AI support in the offline TINA provides flexibility and privacy. You can use local AI models to design and simulate circuits locally without relying on internet connectivity or leverage the power of cloud-based AI services.
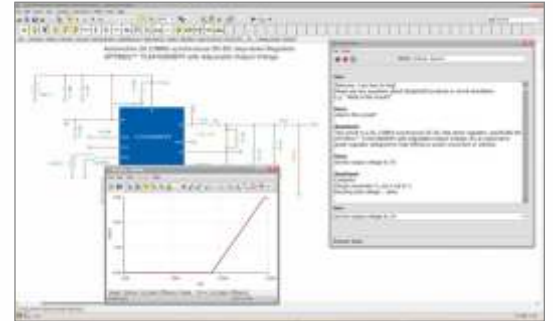
- Providing information on circuits
- Designing LDO and SMPS power supply circuits,
- Designing active and passive filters,
- Designing analog oscillators and digital clock generators
- Selecting and redesigning evaluation circuits from different manufacturers
- Generating Arduino code for rapid prototyping
- Image recognition with python or MCU
- creating step-by-step solution of simple DC/AC circuits
- Creating quizzes and riddles and check their solution

TINA and TINACloud AI helps you create quizzes for any circuit. Just provide the circuit name for well-known ones, or add a title and description for less familiar circuits. AI analyzes your request and provides a detailed summary of your learning progress.
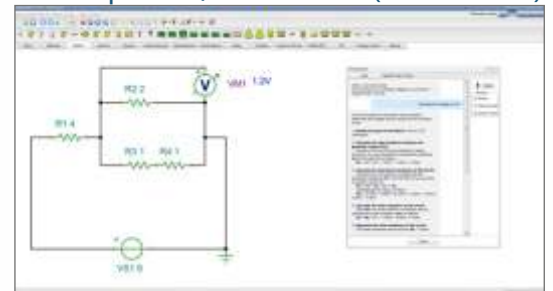

Providing information and redesigning a Switch Mode Power Supply (TINA)

Presenting a Colpitts oscillator circuit and providing information
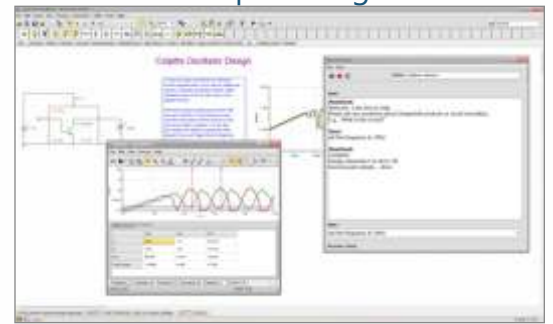
Creating step-by-step solution of simple DC/AC circuits (TINACloud)

Creating a simple Arduino code for prime numbers up to 100


Riddles on electricity and electronics
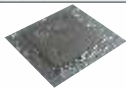
Hardware Description Languages

VHDL

TINA includes an advanced VHDL compiler generating high-performance machine code, ahead of execution. You can mix VHDL blocks with other HDL language blocks (Verilog, Verilog-A and AMS), Spice macros, and TINA's built in schematic components. You can edit the source of any VHDL or other HDL components, see the result instantly on the indicators of TINA's interactive mode, display on analog or digital virtual instruments or in diagrams from the Analysis menu. When you start an analysis TINA automatically compiles all digital HDL blocks into optimized machine code and connects them with the other analog and digital parts of the circuit. You can also simulate placed and routed designs on chips, both in digital and mixed analog-digital environment, using the post-place and route simulation model (SIMPRIM-based VHDL and a Standard Delay Format (SDF) file) of Xilinx. With the optional external VHDL simulator, you can develop and debug your VHDL code both externally and inside TINA. The external VHDL simulator includes Waveform Display, Project Management and Hierarchy Browser. TINA's VHDL implementation supports the IEEE 1076-87 and 1076-93 language standards, 1164-93 Standard Logic, Vital, Simprim and Unisim.
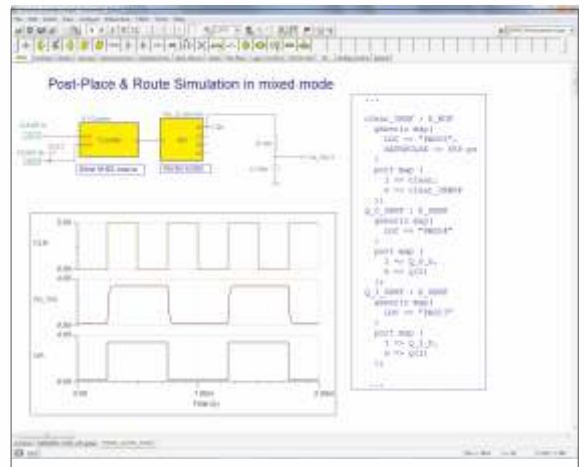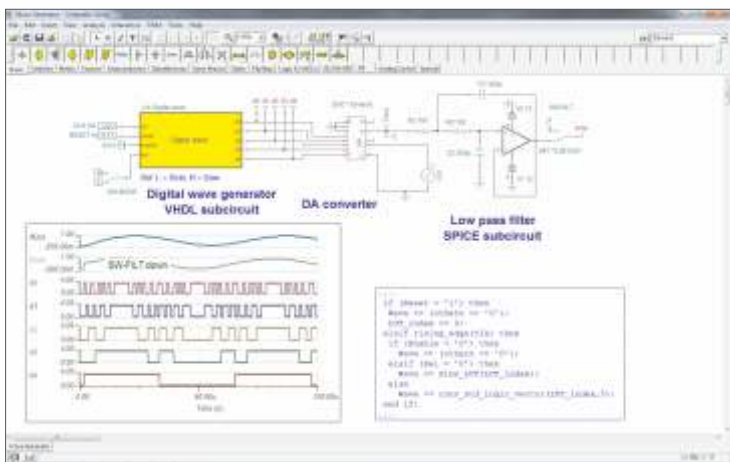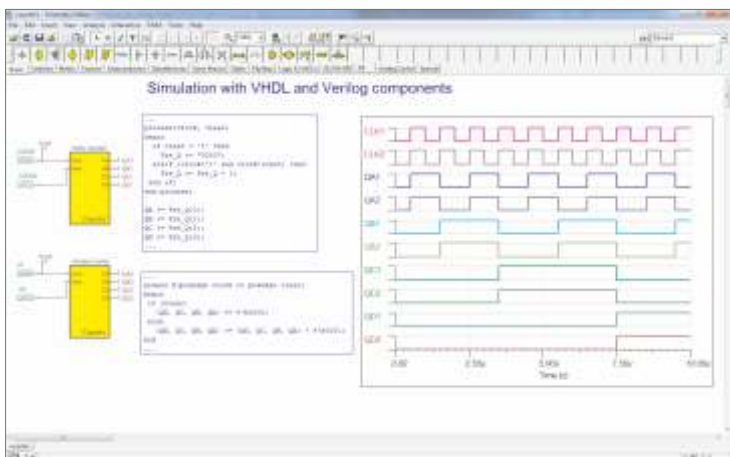

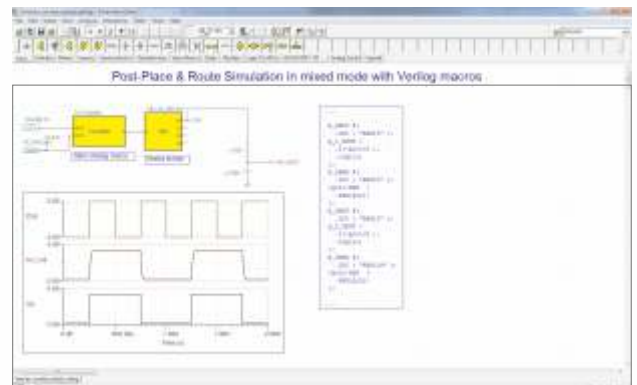Post-Place & Route Simulation in Mixed Mode

Verilog

In addition to VHDL TINA now also includes an advanced Verilog compiler generating high-performance machine code. You can combine Verilog blocks with other HDL language blocks (VHDL, Verilog-A and AMS), Spice macros, and TINA's built in schematic components. You can edit the source of any Verilog or other HDL components and see the result instantly on the indicators of TINA's interactive mode, display on analog or digital virtual instruments or in diagrams from the Analysis menu. When you start an analysis TINA automatically compiles all digital HDL blocks into optimized machine code and connects them with the other analog and digital parts of the circuit. You can also simulate placed and routed designs on chips, both in digital and mixed analog-digital environment, using the post-place and route simulation model (SIMPRIM-based Verilog and a Standard Delay Format (SDF) file) of Xilinx. With the optional external Verilog simulator, you can develop and debug your Verilog code both externally and inside TINA. The external Verilog simulator includes Waveform Display, Project Management and Hierarchy Browser. TINA's Verilog implementation supports the IEEE Verilog1364 standard, Simprim and Unisim.
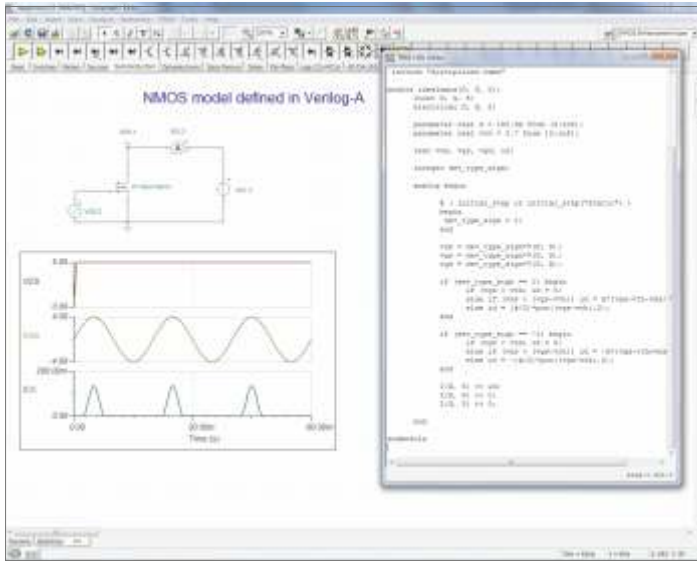

Simulation with VHDL and Verilog components

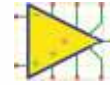Post-Place & Route Simulation in Mixed Mode with Verilog Macros

VHDL, Verilog, Verilog-A, SystemC & AMS

TINA now supports the most common Hardware Description Languages and their analog extensions.

NMOS transistor model in Verilog A

Verilog-A

TINA v10 and later versions support the Verilog-A Hardware Description Language. Verilog A is a behavioral language for describing analog and mixed-signal systems in an easy to follow high level C-style syntax.
You can create your own analog models in Verilog A, add to the system as a macro, freely combine with other HDL and Spice macros and TINA's built in schematic components. The example shows the definition and use of a NMOS transistor model in Verilog A. The language helps to avoid coding errors since derivatives are generated automatically, the code is readable and self-documenting.
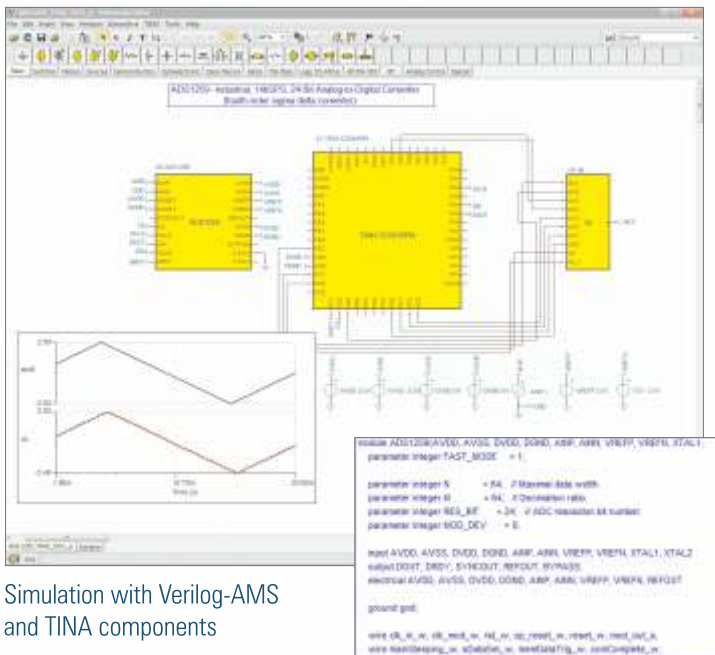
Simulation with Verilog-AMS
and TINA components

Verilog-AMS

TINA v10 and later versions also support the Verilog-AMS Hardware Description Language, a merger and extension of Verilog and Verilog-A, both supported in TINA. Due to the merge of a the two powerful digital and analog HDLs, Verilog-AMS is now an industry standard modeling language for mixed signal circuits. You can create your own mixed circuit models in Verilog-AMS and turn into TINA macros. You can also freely mix Verilog-AMS macros with other HDL macros and TINA's schematic components. The example demonstrates a realization and comparison of the same mixed circuit with a Verilog-AMS code and TINA's schematic components.

SystemC

SystemC is another great tool for modeling hardware. It includes all the features of C++, used all over the world, and a C++ class library specially designed for system design. SystemC has an open-source free implementation and you can compile it into a very efficient executable binary code with the also free Visual Studio Community C++ compiler of Microsoft. In SystemC you can model hardware at a higher abstraction level than in other HDLs and so for modeling some very complex hardware e.g. microcontrollers it is more easy and efficient to use than other HDLs like VHDL or Verilog. In v11 and later versions of TINA you can also create and use components modeled in SystemC both in TINA and TINACloud.
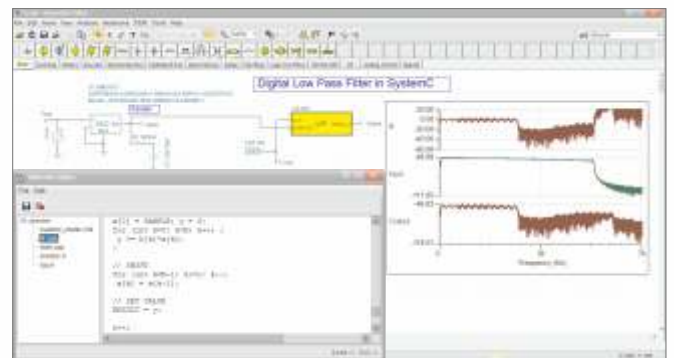
Simulation with SystemC and TINA components

Advanced Analysis Tools
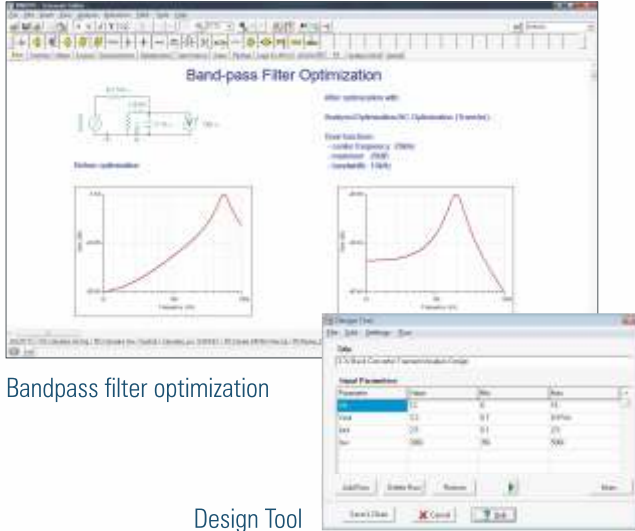
Bandpass filter optimization

Design Tool

Multiparameter Optimization & Design Tool

Through optimization, TINA will optimize a circuit response to one or more predefined target values by automatically varying the values of one or more circuit parameters. The target circuit response (voltage, current, impedance, or power) must be "monitored" by a meter or meters previously inserted at the desired location(s). The unknown circuit parameter(s) will be determined automatically so that the circuit will produce the target output. Two alternative iterative methods (simple and pattern search) are used to find the optimum. Alternatively, you can use TINA's Design Tool which works with the design equations of your circuit to ensure that the specified inputs result in the specified output response.
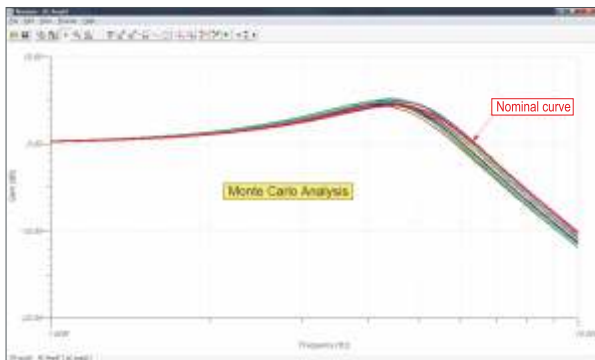
Noise Analysis

TINA includes both linear small signal AC Noise Analysis and Transient Noise Analysis. AC Noise Analysis determines the noise spectrum with respect to either the input or the output. The noise power and the signal-to-noise ratio (SNR) can also be calculated. When the noise influences the system behavior in a nonlinear way, linear noise analysis is no more satisfactory and Transient Noise Analysis, that is simulation in the time domain is necessary and possible in TINA.

Transient Noise Analysis

Total Noise Spectrum

Monte Carlo and Worst Case Analysis

Tolerances can be assigned to the circuit elements for use in Monte-Carlo or worst-case analyses. The results can be evaluated statistically using expected means, standard deviations, and yields. Moving the cursor onto a particular curve retrieves the corresponding component values so that extreme results may be interpreted. The tolerance models provided for each component allow uniform, Gaussian, or general distribution. Using general distribution, you can define asymmetric tolerance as well as group tolerance.
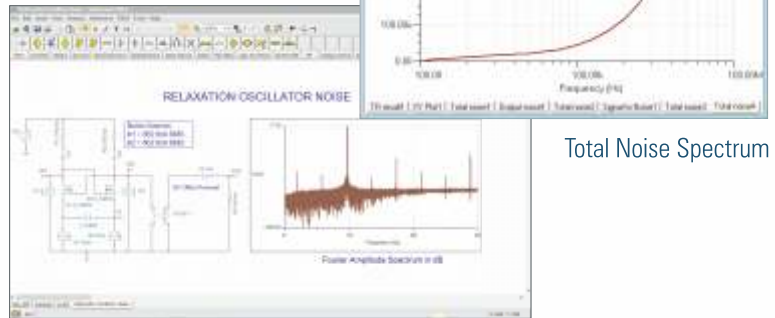
Monte-Carlo Analysis

Fourier Analysis

TINA calculates both the Fourier series of periodic signals and the continuous spectrum of non-periodic signals. For periodic signals, TINA calculates the coefficients of the Fourier series as well as harmonic distortion. The Fourier series are presented both in exponential and trigonometric form, while the continuous spectrum is presented as amplitude density and phase or as amplitude density of cosinusoidal and sinusoidal components. You can carry out Fourier Analysis directly from the Analysis menu or after Transient Analysis for any curve in the diagram window.

Fourier Series

Advanced Analysis & Synthesis Tools

Determine network parameters, analyze SMPS circuits and even synthesize filters or logic circuits with these powerful tools.

Network Analysis

TINA's network analyzer allows you to determine the S, Z, Y and H parameters of networks. You can display the result of network analysis either in the diagram window or on the Network Analyzer screen. Results can be presented on Smith, polar, or orthogonal diagrams. You can move the cursor along a curve to display the value of the S, Z, Y, H network parameters. You can carry out network analysis both through AC analysis or with the Network analyzer virtual instrument.
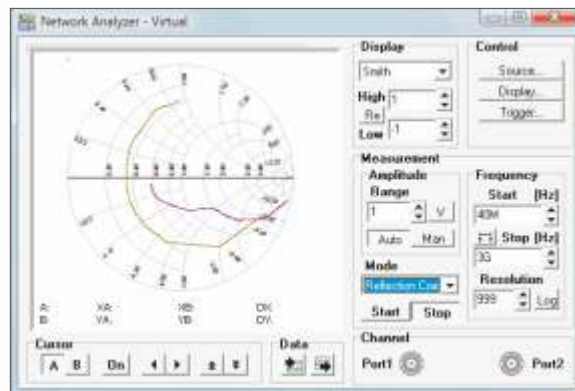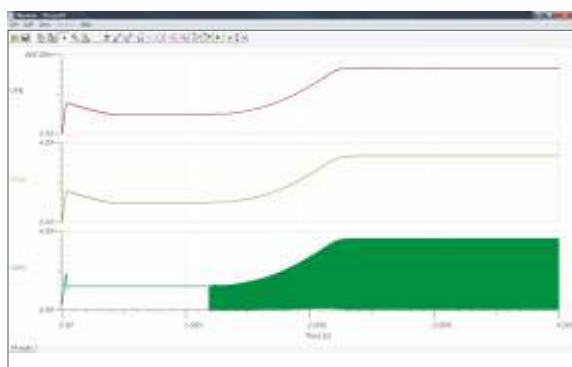

Smith Diagram

SMPS Analysis

SMPS or Switching-Mode Power Supply circuits are an important part of modern electronics. The heavy transient analysis needed to simulate such a circuit may take a lot of time and computer storage. In order to support the analysis of such circuits TINA provides powerful tools and analysis modes. The most time consuming part of an analysis of an SMPS circuit is to reach its steady state, when the DC level of the output voltage does not change and the output waveform has only a small periodic ripple. To find this state automatically, TINA has a powerful Steady State Solver. You can also make accelerated Input step and Load step analyses based on the initial values provided by the Steady State Solver.

Startup transient of an SMPS circuit

Filter Design

TINA now includes a powerful filter design tool that accepts your filter specification (given in table or graphic form). TINA then determines the transfer function, the appropriate component values, and Bode diagram of the resulting filter. Next, if you intend to incorporate the filter into a larger project, you can transfer the schematic diagram of the filter to TINA's Schematic Editor where you can modify or analyze the circuit further and add it to your design. The filter tool can realize both passive and active filters with low pass, high pass, band pass, and band stop templates, using Butterworth, Chebyshev, Inverze Chebyshev and Elliptic approximations. You can select to realize the active filters with ideal Operational Amplifiers as well as simplified or manufacturer made Opamp models.
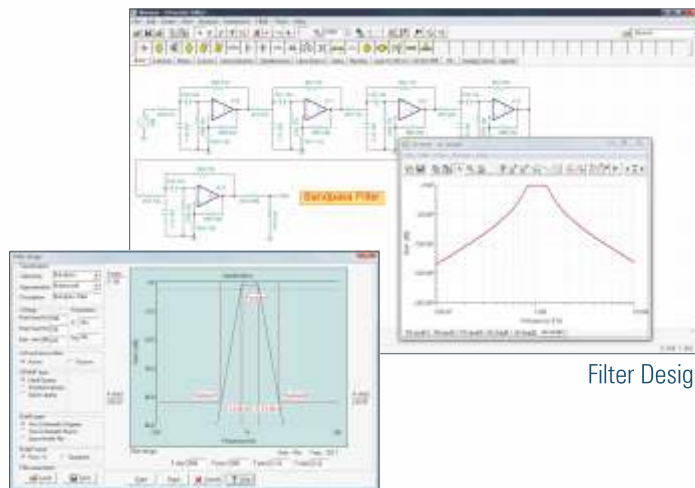
Filter Design
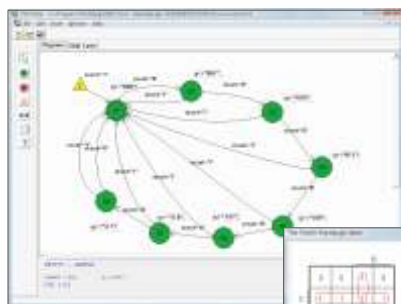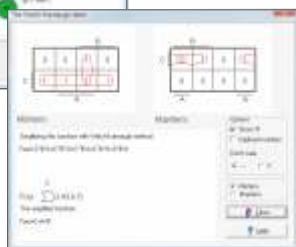
Logic and Finite State Machine Design

With the Logic Design module of TINA you can simplify logic expressions or Truth tables using several methods (Veitch-Karnaugh, Quine-McCluskey), draw the simplified schematic diagram and transfer into TINA to use, modify or connect with your circuit.

For educational purposes you can also determine minterms/maxterms or truth table from logic expressions or vice versa. With the Finite State Machine (FSM) Editor you can graphically design complex FSM diagrams, generate the corresponding VHDL macros then transfer and run them in TINA along with other macros and components.

Karnaugh Map

FSM Diagram

PCB Layout Design

The fully integrated PCB layout module of TINA has all the features you need for advanced PCB design.
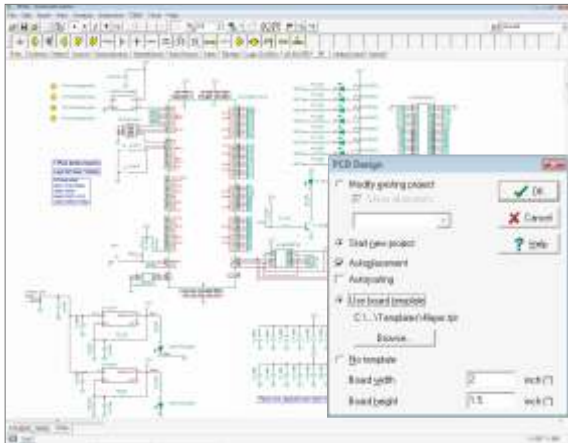
PCB Design

PCB Design

The fully integrated PCB layout module of TINA has all the features you need for advanced PCB design. Once you have completed your schematic and run simulations, before starting PCB design, TINA will check each of the components in your design and verify its footprint. When you have finished checking footprints and shapes, use TINA's 2D/3D view button to see those parts which have been given a 3D view.. If there is some problem with a component you can change the physical view by double clicking the schematic symbol of the part and selecting the correct physical version.

Automatic and Manual Design Tools

TINA's advanced PCB designer has all the features you need for today's sophisticated PCB design, including multilayer PCBs with split power planes, powerful autoplacement & autorouting, rip-up and reroute, manual and "follow-me" trace placement, DRC, forward and back annotation, pin and gate swapping, keep-in and keep-out areas, thermal relief, fanout, plane layers, bus & differential pair drawing tools, circuit block copying, 3D view from any angle, Gerber file output and much more.
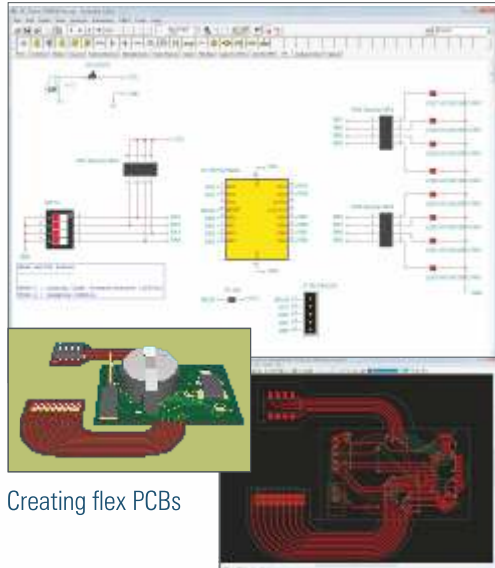

Creating flex PCBs

Flex PCBs, that is PCBs with electronic devices mounted on flexible plastic substrates, are very common in modern electronics where space is a critical factor e.g., cameras, mobile phones etc.. TINA supports Flex PCB design with various tools and makes them easier to design. Using TINA's 3D viewer, you can visualize your design in 3D from any angle, along with the connected rigid PCB and the parts mounted both on the rigid and flexible part of the construction.

Creating flex PCBs

Importing Enclosures

TINA's integrated PCB designer now can import enclosures designed in industry standard applications or available from manufacturers, and check the PCB for fit. You can also import footprints and 3D STEP models available for download.
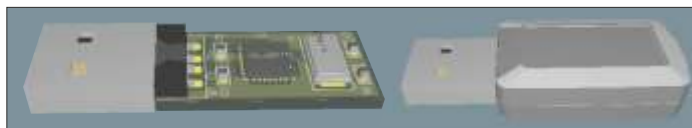
Enclosures in TINA

Animated 3D view

Animated 3D view

TINA has a powerful 3D Viewer for visualizing PCB designs and other parts connected to the PCB, such as batteries, instruments, wires etc.. The same viewer is used to show 3D virtual prototypes on breadboards. You can rotate the design with the mouse instantly into any direction and zoom in and out to check every detail of your construction. In addition you can bring the design to life by using interactive simulation in TINA. Now LEDs will light, LCDs will display and you can use all the interactive controls in your design. Using these features, you can evaluate user interfaces in advance of the real product hardware.
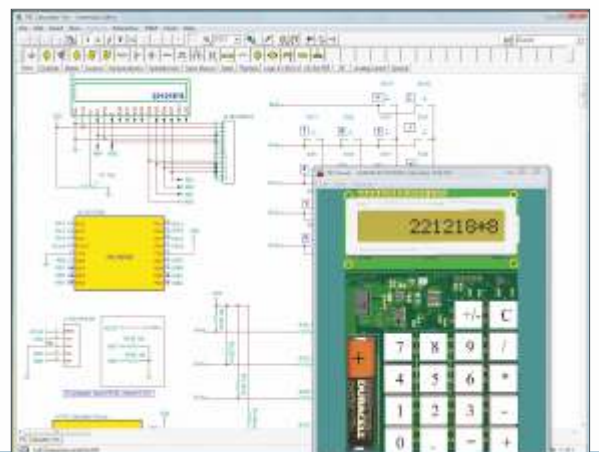
Learning, Teaching and Training

TINA's strong educationally oriented features give educators the tools
they need for effective computer-supported training.

1200 circuits and Integrated E-books

TINA can be supplemented by a collection of 1200 example circuits
and problems, covering virtually the entire world of electronics from
DC to Analog and Digital circuits. In addition, several textbooks from
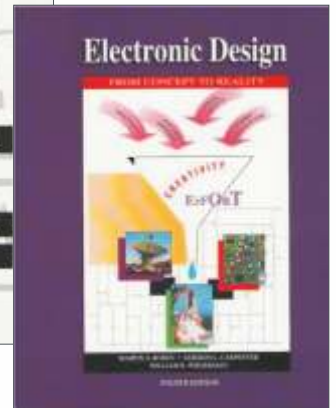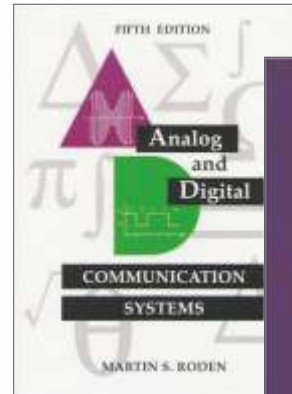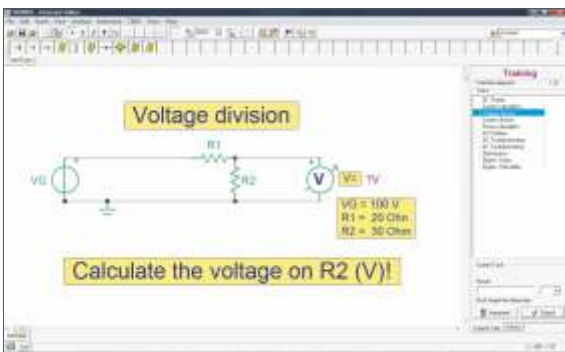leading authors are available, packed with circuits which come to
life by just a mouse-click. Campus, site and student licenses are
available for the e-Books, (which can be integrated with any version
of TINA). Save the environment and learn from these paperless
textbooks in the campus, classroom or at home.

Integrated E-books

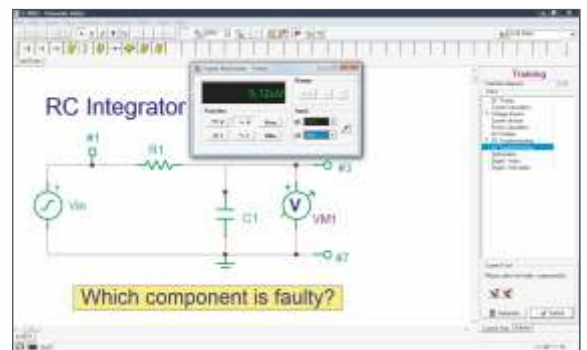Problem Solving with TINA

Problem Solving with TINA

TINA has two special operating modes for training and examination.
In these modes, the student works on problems under the supervision
of TINA, which will solve the problems but wait and check the
student's answer. A student can use symbolic names of components
and answer with either formulas or numbers. In training mode, TINA
warns the student of a wrong answer; in examination mode, it will
simply evaluate and record the answer. A large collection of problems
already worked out by teachers is available.
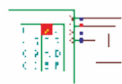
Teach and Learn Troubleshooting

There are several ways TINA can help teach troubleshooting. One
way is through fault simulation in software. A circuit in TINA may
have several 'shadow circuits', each containing one or more faulty
components. The shadow circuits are hidden from the student, who
can carry out virtual measurements to find and replace the faulty
parts. Another option is to use the supplementary hardware, insert
faults into the TINA Electronics Experiment Modules, and then find
the faults with the aid of real and virtual measurements.

Troubleshooting with TINA
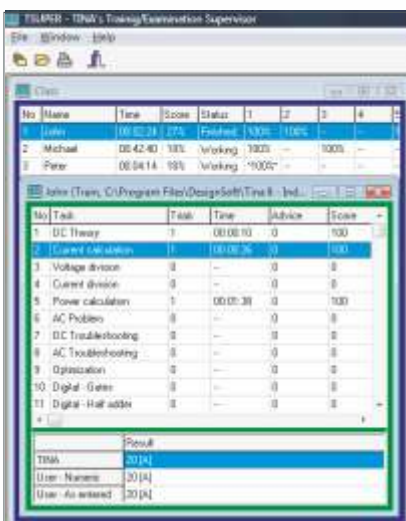
TINA's Training
Supervisor

TINA as a Learning Management Tool

TINA automatically follows and records every problem solving and
troubleshooting move made by a student, allowing the instructor to
provide detailed and appropriate feedback. In a laboratory with
multiple computers on a network, TINA's supervisor program allows
the teacher to see all the students' activities and focus on a selected
student's results. You can use the built-in Exam Manager to create
your own sets of problem solving and troubleshooting exercises. You
can also add multi-level hints to your problems.

TINA
Design Suite
THE COMPLETE ELECTRONICS LAB

TINA *Design Suite* is a powerful yet affordable circuit simulation and PCB design software package for analyzing, designing, and real time testing of analog, digital, Verilog, Verilog A & AMS, VHDL, SystemC, MCU, and mixed electronic circuits, their PCB layouts and Mechatronics Systems. You can also analyze SMPS, RF, communication, and optoelectronic circuits; generate and debug MCU code using the integrated flowchart tool; and test microcontroller applications in a mixed circuit environment. A unique feature of TINA is that you can bring your circuit to life with the optional USB controlled TINALab II and LogiXplorer hardware, which turns your computer into a powerful, multifunction T&M instrument. Electrical engineers will find TINA, now enhanced with *super-fast multi-core engine*, an easy to use, high performance tool, while educators will welcome its unique features for the training environment.

Components

The TINA library includes over 33,000 parts, including 1400 MCUs and manufacturer models which can be modified by the user. In addition, you can create new TINA components from any Spice subcircuit or S-parameter table whether created by yourself, downloaded from the Internet, or obtained from a manufacturer's CD. TINA's intelligent Library Manager will help you to automatically convert manufacturer's data to TINA subcircuits.

Component models include:

Passive components: resistor, potentiometer, thermistor, lamp, capacitor, lossy capacitor, charged capacitor, inductor, energy-storing inductor, coupled inductors, nonlinear coil, transformer, relay, diodes (including Zener, multi-color LED, varicap, Schottky, Graetz, diode arrays), motor, transmission line, fuse.

Active components: bipolar transistor (NPN and PNP), darlington transistor, MOS transistor (including BSIM3 models), JFET (N and P channel), GaN and GaAs transistors, IGBT, thermistor, thyristor, triac, diac, ideal or nonlinear operational amplifier, transient and average SMPS models, AD&DA converters (SAR & Sigma-delta), manufacturer made Spice models, optoelectronic components: photodiode, phototransistor, solar cell, optocoupler.

Sources: current source, voltage source, current generator, voltage generator, standard and arbitrary user-defined waveforms, PWL, WAV file, linear and nonlinear controlled sources (CCCS, VCCS, CCVS, VCVS), digital pulse source, digital clock.

Basic digital components: AND, OR, NAND, NOR, and XOR gates with 2, 3 and 4 inputs, buffer, tri-state buffer, inverter, Schmitt inverter, D flip-flop, SR flip-flop, JK flip-flop, D latch

Digital ICs: MCU (PIC, AVR, ARM, ST, XMC, 8051, Arduino), 4000 logic family, 74000 logic family, Verilog, VHDL to test and build your own logic components, FPGA and CPLD libraries

Measuring instruments: voltage meter, voltage pin, test point (for real time measurement), ampere meter, current arrow, power meter, impedance meter.

Other components: time controlled switch, voltage controlled switch, AD and DA converter, timer, comparators, analog control   blocks, pull-up resistor, seven-segment display, keypad, voltage regulator, vacuum tube, passive and active RF components, two ports (S, Z, Y, H).

Virtual Instruments: Digital multimeter, function generator, storage oscilloscope, XY recorder, digital signal generator, logic-, signal-, spectrum-, and network-analyzer

Supplementary Hardware: Expand TINA into a complete lab with the following hardware components:

LabXplorer & TINALab II: High Speed Multifunction PC Instruments, with remote control & USB interface Multimeter, oscilloscope, logic analyzer, signal analyzer, spectrum analyzer, function generator, variable voltage power supply and digital signal generator function. Slot for plug-in electronics experiment modules

Electronics Experiment Modules for TINALab II and LabXplorer to illustrate the operation of circuits, to develop and evaluate troubleshooting skills

FPGA Development Kit for TINALab II provides an easy-to-use, low-cost evaluation platform for developing designs and applications based on the Xilinx Spartan-II FPGA family.

Licensing options: DesignSoft provides many licensing options, both for **industry** and **education** depending on your needs and environment. Licenses include both **32-bit** and **64-bit** editions. **For industrial users** beyond individual licenses, discounted second and site licenses are available with different capabilities and price points. **For education,** in addition to individual teacher and student licenses, a wide choice of site licenses are available including campus licenses for whole institutions. Along with campus licenses **downloadable or online student licenses for home use** and for the whole campus are also available. Contact DesignSoft or your local DesignSoft distributor for further details.

DesignSoft

www.tina.com   *www.designsoftware.com*