

Deeds:

E-Learning Environment for Digital Design

Deeds is the acronym of

Digital Electronics Education and Design Suite

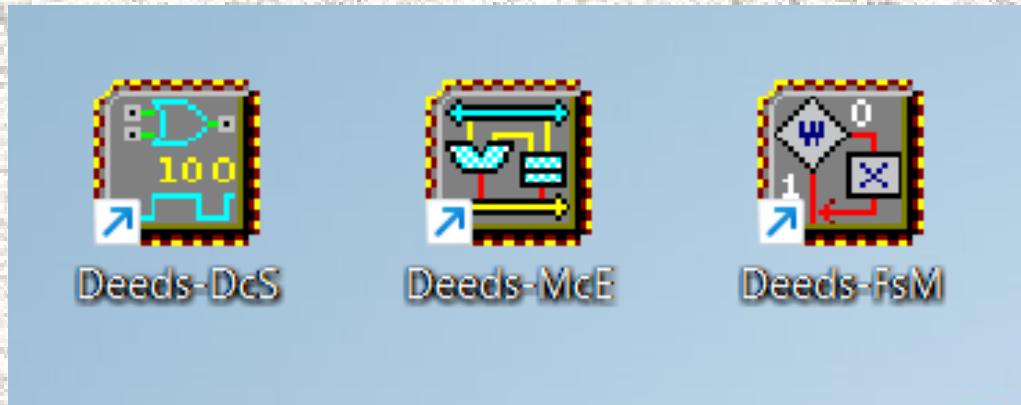


What is **Deeds**?

- **Deeds** is a set of educational tools for Digital Electronics, characterised by a “learn-by-doing” approach.
- **Deeds** covers the following areas:
 - combinational and sequential logic
 - finite state machines
 - microcomputers

What is ***Deeds***?

- ***Deeds*** includes three design tools:
 - **Deeds-DcS** (Digital Circuit Simulator)
 - **Deeds-FsM** (Finite State Machine Simulator)
 - **Deeds-McE** (Micro Computer Emulator)



What is **Deeds**?

- **Deeds** tools are available to the community of Digital Design teachers and students.
- **Deeds** learning materials can be shared within the community.
- **Deeds** website

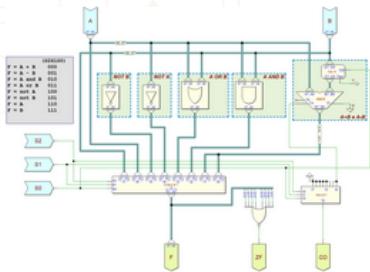
Deeds website



HOME DEEDS SIMULATOR LEARNING MATERIALS BOOKS

Welcome to Digital Electronics Deeds

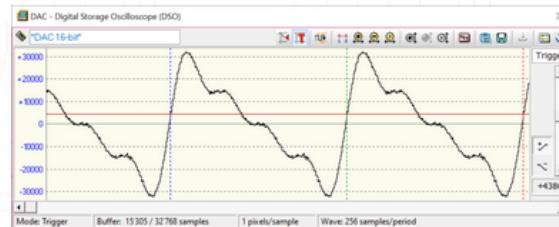
(by Giuliano Donzellini)



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News

New Deeds version published (2.50.200)



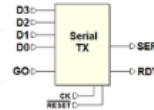
The new version introduces the *Digital Storage Oscilloscope (DSO)* (associated with the virtual DAC component) and the new *Attenuator components*... ([read more](#))

Introduction to Microprocessor-based Systems Design

Ideas & Projects

Synchronous Serial Transmitter (4 bits)

In this example, we'll design a simplified 4-bits synchronous serial transmitter... ([read more](#))



Synchronous Serial Receiver (4 bits)

Let's design a 4-bits synchronous serial receiver. The unit will receive serial sequences on... ([read more](#))

Synchronous Serial Communication System (4 bits)

In this example, starting from the



What **Deeds** includes? (1)

- The **Main Program** and the **Official Deeds** website, to navigate among lessons, exercises and laboratory assignments
- A **Digital Circuit Simulator**, that includes:
 - A schematic **Editor**
 - An interactive **circuit Animator**
 - An interactive **Timing Simulator**

Deeds as Learning Environment

- A collection of tools and text material that help students acquiring:
 - Theoretical foundations of the subject
 - Analysis capabilities
 - Ability to solve problems
 - Practical synthesis and design skills

Deeds - The online Learning Materials

- The page showing an index with aside a lab exercises
- All text and objects in the page can be Active.
- By clicking on the schematics, the circuit shown will be loaded in the Digital Circuit Simulator, ready to be tested or modified

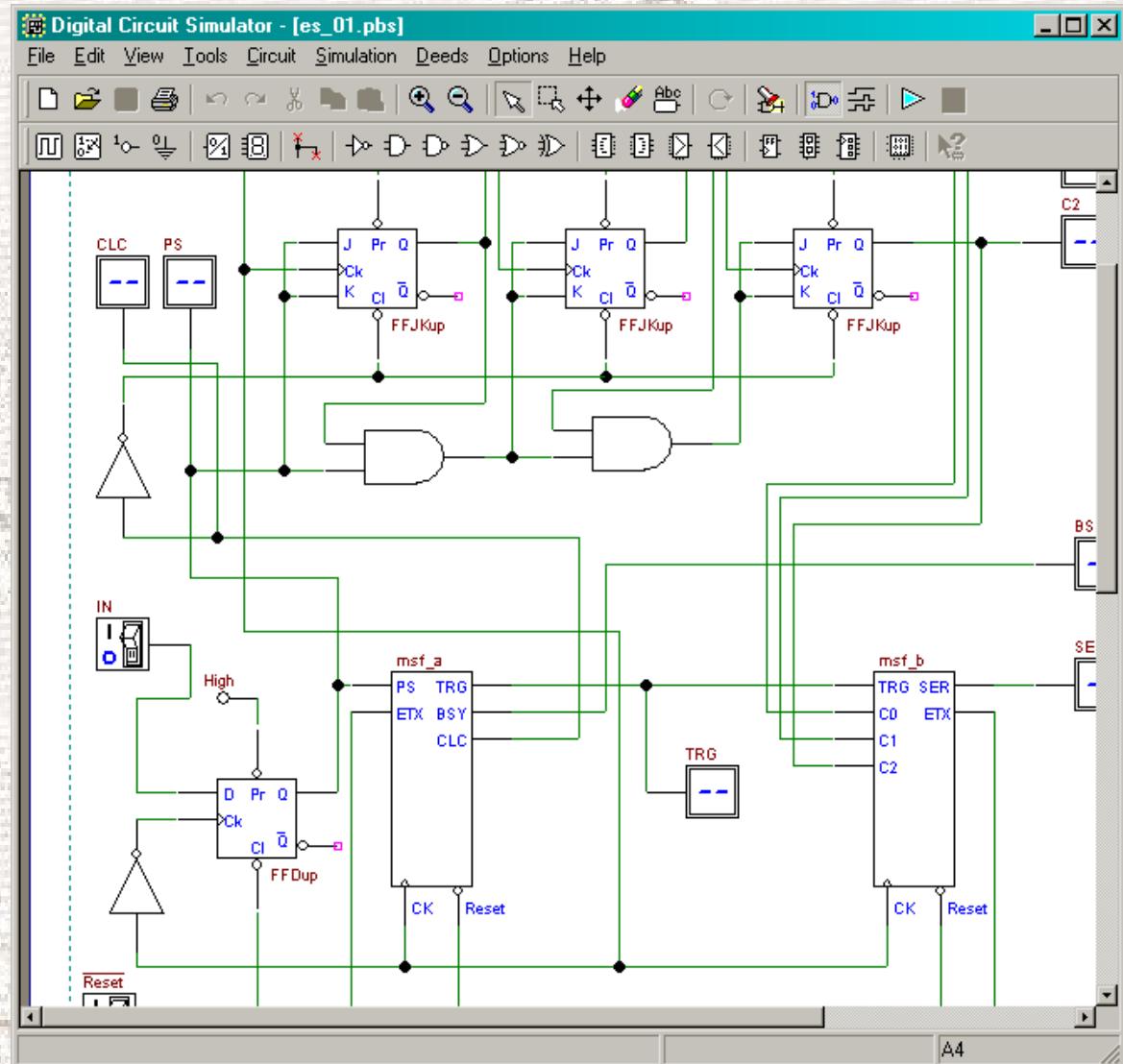
The screenshot shows a web browser window with the following content:

- Header:** Import bookmarks..., Getting Started, Recently Bookmarked, Arabic Keyboard Only..., To Do, personal, utility bills, Other Bookmarks.
- Title:** Introduction to digital electronics
- Author:** Giuliano Donzellini, Domenico Ponta
- Language:** Italian (flag)
- Version:** v1.71
- Content:** An introductory exercise about a digital circuit simulator. It includes a schematic diagram of a logic network with three inputs (A, B, C) and one output (OUT). The output is connected to a logic gate (AND gate).
- Text:** "In this introductory exercise you will test the simple logic network represented in the figure below and, at the same time, you will gain confidence with the **Digital Circuit Simulator (d-DcS)** of the **Deeds**. To open the file in the d-DcS, just click on the figure."
- Diagram:** A logic circuit diagram with three inputs (A, B, C) and one output (OUT). Input A is connected to the first input of an AND gate. Inputs B and C are connected to the second and third inputs of the AND gate respectively. The output of the AND gate is labeled OUT.
- Text:** "Next step is to check the behavior of the network. You will start the **functional simulation (Interactive Animation)** of the network by clicking, on the **d-DcS toolbar**, the command . Now the three input switches A, B and C can be toggled and the gate's output OUT will change accordingly. We suggest that you draw the truth table for a three variable boolean function and then fill the output column with the data resulting from the simulation."
- Text:** "Last task requested is the **timing simulation** of the same network. You start the timing simulation of the network by clicking, on the **d-DcS toolbar**, the command . The input values must be drawn directly on the **timing diagram window**. You should define the values versus time of the three inputs, such as all the possible combinations of A, B and C are tested."
- Table:** A table listing topics:

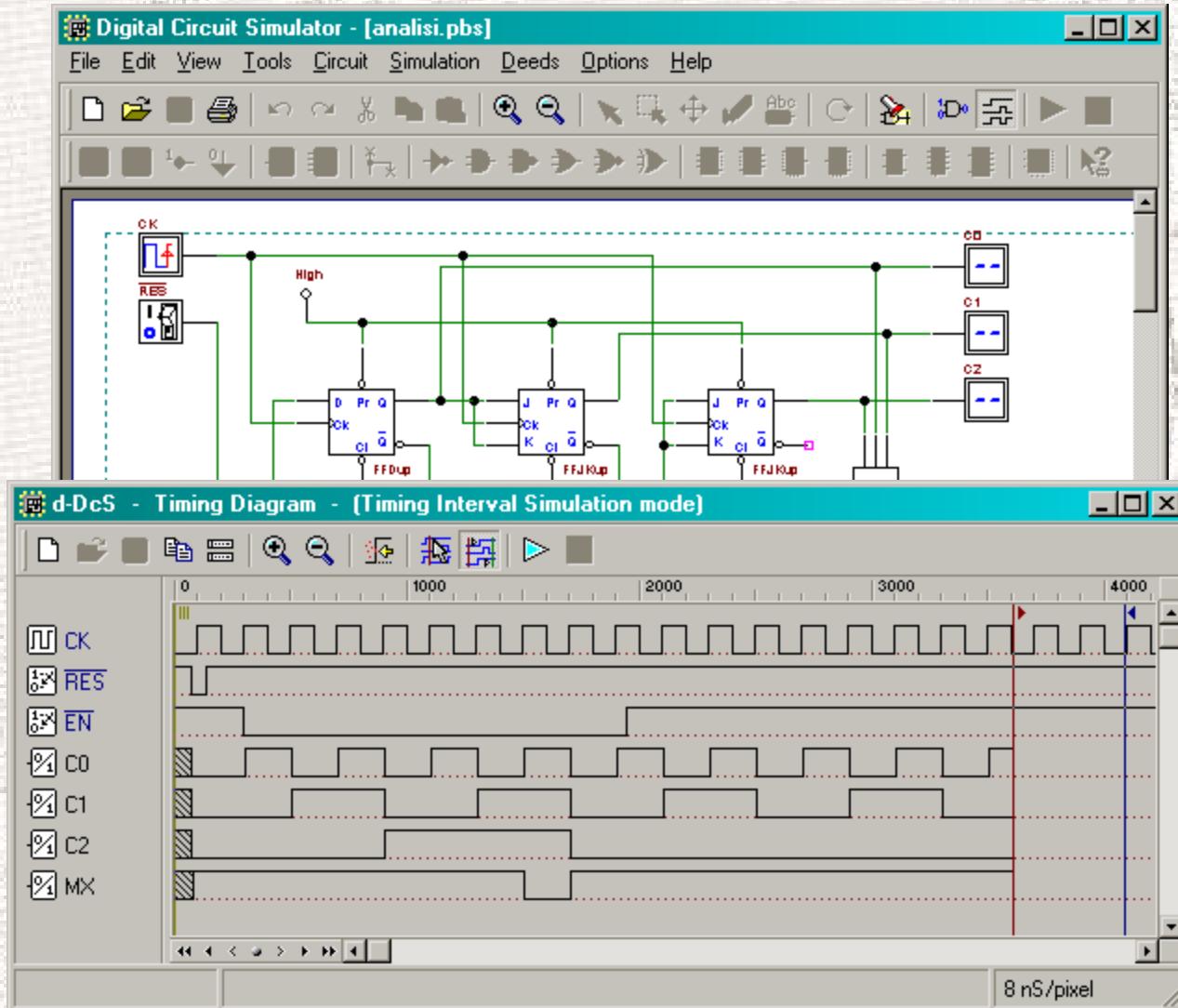
Topic		Download
1	Introduction to digital electronics	Download
1.1	Introduction to the Digital Circuit Simulator	001001
1.2	Analysis of simple logic gates	001002
2	Multiplexers and Demultiplexers	Download
2.1	Analysis of a multiplexer (2 to 1)	005030
2.2	Analysis of a demultiplexer (1 to 2)	005040
2.3	Analysis of a simplified shared-line communication channel	005050
3	Applications of Boolean Algebra	Download

Deeds - The d-DcS Digital Circuit Simulator

- The **basic operations** of professional tools have been adapted to the **educational needs**
- The components available on the bin are **simple to understand**
- We avoided complex real components, that could confuse the beginner
- Two simulation mode are available:
 - Interactive Animation*
 - Timing diagram*

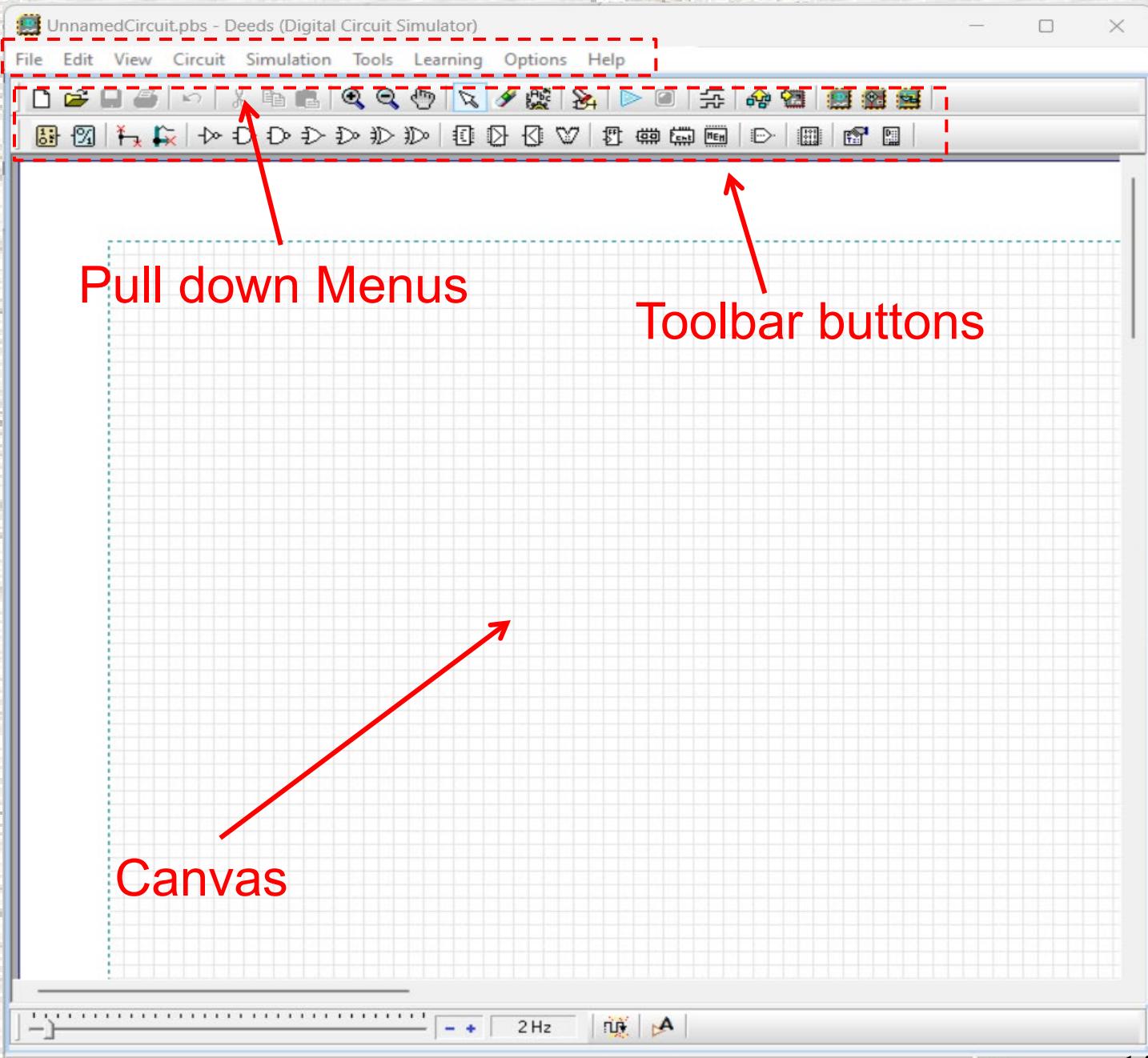


Deeds - The d-DcS Timing Simulator



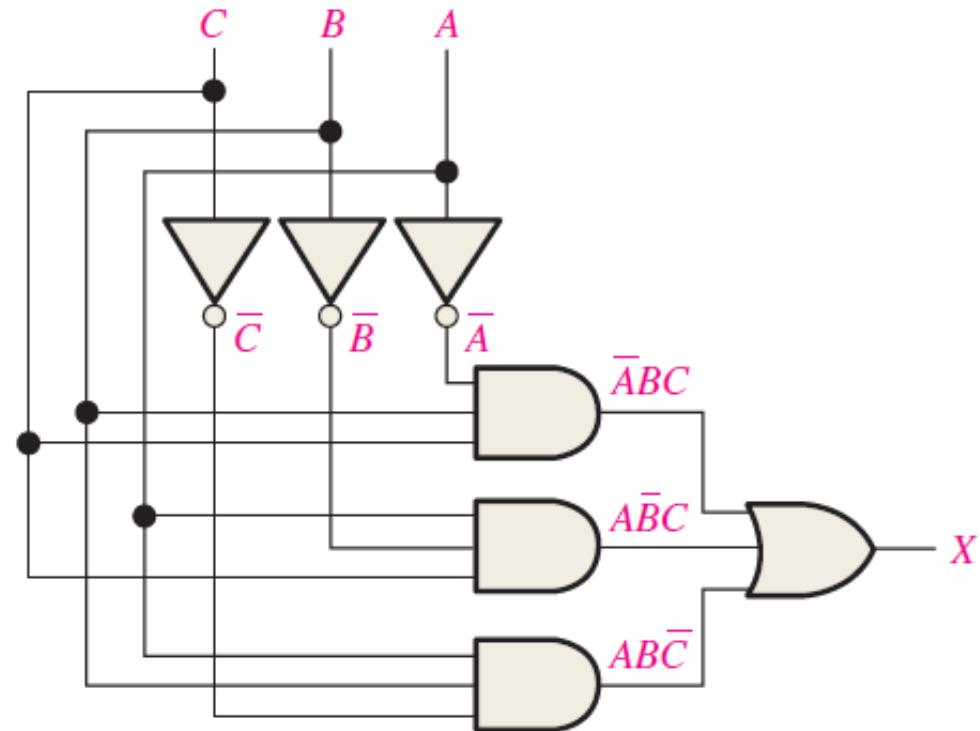
- Timing simulation can be executed in various operation modes
- Clock and input signals can be easily edited
- Timing simulation can be interactive, for the beginners, with a event-by-event approach, or can be launched defining a time interval, as in professional tools

Deeds - The interface



The demo session

Exercise: Create this circuit in Deeds



Exercise: Create this circuit in Deeds

- Verify your circuit with this Truth Table

TABLE 5-4

Inputs			Output	Product Term
A	B	C	X	
0	0	0	0	
0	0	1	0	
0	1	0	0	
0	1	1	1	$\bar{A}BC$
1	0	0	0	
1	0	1	1	$A\bar{B}C$
1	1	0	1	$AB\bar{C}$
1	1	1	0	