Digitale Schaltungssimulation im Browser

user guide- english

Version 1.0

25.04.2017

document history

version	date	author	comments
1.0	25.04.2017	jknu	initial

Table of contents

1 BEAST

1.1 General

BEAST (Block diagram Editing and Simulating Tool) is a web module to simulate and visually figure a digital circuit. In the process components can be assembled to a block diagram.

Additionally, apart from circuit modification and simulation, there is the possibility in BEAST to organize components in libraries and projects. Thereby different scenarios in library and project form can be imported and exported.

1.2 BEAST Access

Because BEAST represents a web module, it's used in a browser. BEAST can be accessed directly by an URL or used alternatively as a module in a comprehensive web site.

An embedded version of BEAST grants the advantage to set and read in-ports and out-ports from the outer part of the website. A comprehensive guide for doing this, can be found in the proper specification.

1.3 Project Structure

BEAST uses a project structure, where a project is comprised of a project block diagram, which generally represents a superordinate circuit. Additionally, a project contains libraries.

1.4 Libraries

Libraries are divided into basic libraries and specific libraries.

1.4.1 Basic Libraries

BEAST contains three different basic libraries. There is the "basic library", the "basic compound library" and a deposit.

Basic libraries can't be edited, deleted and moved into other libraries. They can only be used for creating a circuit and modification of an existing circuit by dragging them onto the current workspace.

1.4.2 Specific Libraries

As soon as a (specific) library is created, components can be added to it. To do this the components (drag and drop) are dragged into the target library. Specific libraries can be imported and exported by using the menu bar (Library → Import; Library → Export).

1.5 Components

Components are also divided into basic and specific components. Basic components are part of the basic libraries.

1.5.1 Basic Components

Basic components are part of every single BEAST-Instance and the user can always use them. Compound Components are comprised of basic components and can't be edited.

1.5.2 Specific Components

Users can create specific components. To do this, basic components are assembled to represent a new component when saved. Single components can't be exported. But they can be saved in specific libraries that can be exported.

1.6 Export

If you export your project it will be saved as a .beast-data. These data files got a strict structure. Inside the circuit you can find the project ID and name. Thereafter is an array called "devices", where all components with their name, ID, from which library they come from and the coordinates of the element are located. After the array "devices" you can find the connections between all components. Positioned at the end is the version of beast and all used libraries, except for basic and compound components.

2 User Interface

The user interface of BEAST is divided into three parts. Those are a menu bar in the head area, a navigation tree on the left side and an editor including a toolbar on the right side.

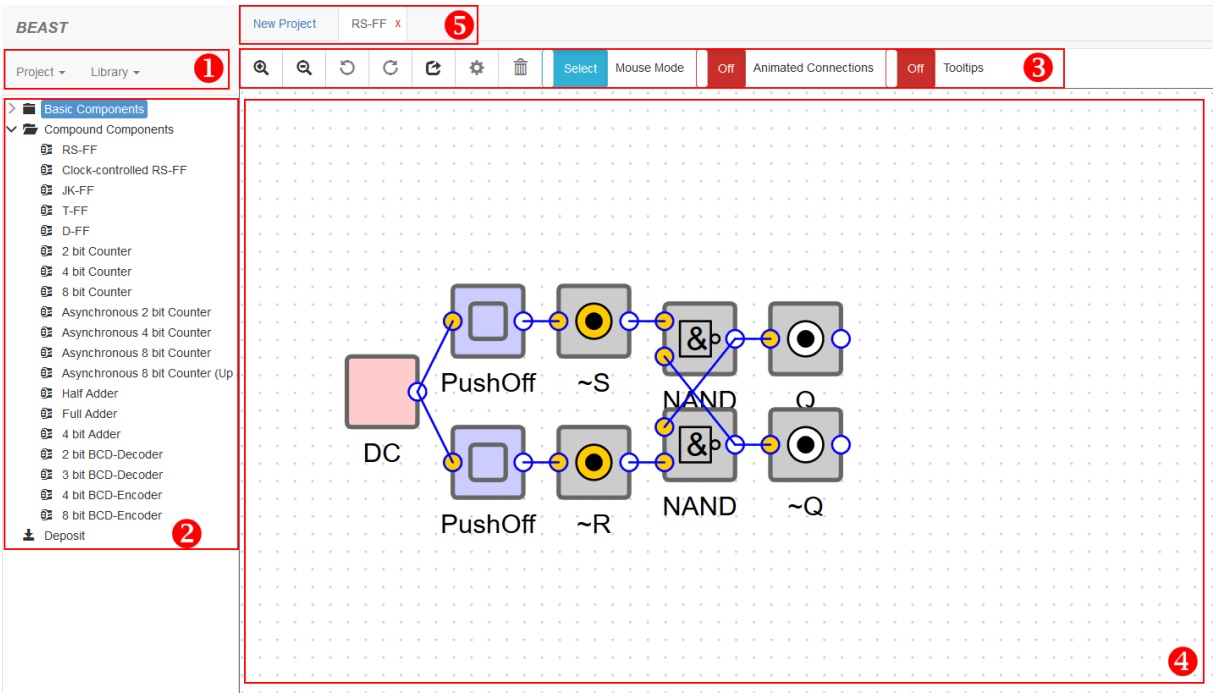


Figure 1: User Interface BEAST

2.1 Menu bar

The function of the menu bar is the BEAST-project-organization (look 1 in figure 1). It's divided into "Project" and "Library".

2.1.1 Project organization

Below the tab “Project” the options for BEAST-projects are located.

New	By clicking the “New” button you can open a new project. If the current project isn’t saved, the user gets the options to save or export the project or cancel the process.
Open	If the user chooses the option “Open” he can load a project from the local storage. Projects get continuously saved in the temporary storage.
Delete	Saved projects can be deleted from the local storage by clicking the “Delete” button. Then the user chooses the project to be deleted.
Export	Projects can be downloaded as a .beast data file. For this option the user chooses the “Export” function. After that he names the project and starts the download of the .beast data file.
Import	Exported projects can be imported into BEAST at any time. For this option the user clicks the “Import” button. Thereupon he can chose and import every .beast Data file from his PC.

2.1.2 Library organization

Below the tab “Library” the options for BEAST-libraries are located.

New	By clicking the “New” button you can create a new library. The user chooses a name and the library is added to the current project.
Export	Libraries can be downloaded as a .bdcl data file. For this option the user clicks the button “Export” and chooses the library he wants to download.
Import	Exported libraries can be imported into BEAST at any time. For this option the user clicks the “Import” button and chooses a .bdcl data file he wants to import.

2.2 Navigation tree

The navigation tree on the left side of BEAST (look 2 in Figure 1) shows the structure of the project. All libraries (basic and specific libraries) are shown as a folder in the tree. Inside the libraries are the components.

Inside the tree the user can use a context-sensitive right-click-menu to change the project structure. Thereby he can edit and delete specific libraries and components.

The tree is also used as a toolbox. All components can be placed on the workspace by drag&drop. One exception is the “Deposit” library. Components that are inside the Deposit can’t be dragged into the workspace.

Compound components can be shown in a new tab by double click on them.

2.3 Workspace

The workspace is assembled by the tab bar, the editor-toolbar and the workspace.

2.3.1 Tab bar

The tab bar serves for parallel display of circuits (look 5 in Figure 1). Thereby compound structures can be shown in different tabs. The user can edit compound components while the main circuit is in a different tab.

The tab with the main circuit can’t be closed.

Are there changes on already used structures, the user has to save it as a new component.

2.3.2 Editor Toolbar

The toolbar (look 3 in Figure 1) offers opportunities for editing the circuit and an option for the simulation.

2.3.3 Editor Workspace

The workspace (look 4 in Figure 1) represents the circuit as a structure of components. The user can open compound components inside the circuit by a double click in a new tab.

The user can connect components inside the workspace and create new compound structures. The workspace also offers a live simulation from all in- and outputs.

3 Block Diagram Editing

For creating a block diagram, you can insert components from the tree on the left side into the workspace on the right side by using drag and drop. To relocate an element, click on it and move it. You can also select and move more than one element. Components are deleted if you drop it outside of the workspace.

As soon as there are components on the current workspace you can link an element to another element by clicking on an output of a component and drop down the left mouse key on an input of another one. While connecting components you can create joints by clicking the “spacebar” and remove them by the “backspace”-key. As a helpful element of the editor there is a toolbar with buttons right above the workspace.

3.1 Buttons

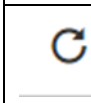
	Zoom In: By clicking on the “Zoom In”-button the workspace is reduced in size and all elements inside are extended. You can also use the mouse wheel to do this.
	Zoom Out: If you click on the “Zoom Out”-button your workspace is extended and all elements inside are shrunk. You can also use the mouse wheel to do this.
	Rotate Left: By selecting one or more elements the “Rotate Left”-button turns its color from grey to black. Now you can click the button to rotate all selected components by 90° left. The shortcut for this event is “ctrl” + “left arrow key”.
	Rotate Right: By selecting one or more elements the “Rotate Right”-button turns its color from grey to black. Now you can click the button to rotate all selected components by 90° right. The shortcut for this event is “ctrl” + “right arrow key”.
	Extract Component: By clicking the “Extract Component”-button you save your workspace as a new component to the deposit and open it in a new tab. In the Deposit you can edit and delete your component or move it into another library in the tree.
	Set Parameter: By clicking one element the “Set Parameter”-button turns its color from grey to black. Now you can click the button to change the parameters of the component. You can do this also by a double click on the component.
	Delete: By selecting one or more elements the “Delete”-button turns its color from grey to black. Now you can click the button to delete all selected components from the workspace. Also, you can use the “del”-key or move them out of your workspace by drag and drop.

Figure 2: Editing Options

3.2 Switch-Buttons

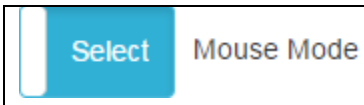
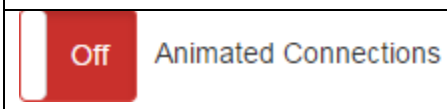
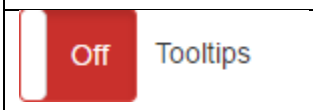
	Mouse Mode: By clicking on the “Mouse Mode”-switch you can swap between select and move. If you chose the select mode you can select one or more components and move them inside the workspace. If you use the move mode you can move your whole workspace by clicking inside and moving the mouse.
	Animated Connections: By clicking the “Animated Connections”-switch you enable and disable the animation of the connections.
	Tooltips: By clicking on the “Tooltip”-switch you enable and disable the tooltip function inside the workspace. If this switch is “On” certain components have their tooltips displayed.

Figure 3: Switch Options

4 Simulation

A circuit that is edited is simulated at the same time. Therefore, the logical assignment at the position of the in and out ports is visible and is represented by different colors. The premise is that the circuit simulation is activated (using the switch button in the editor toolbar).

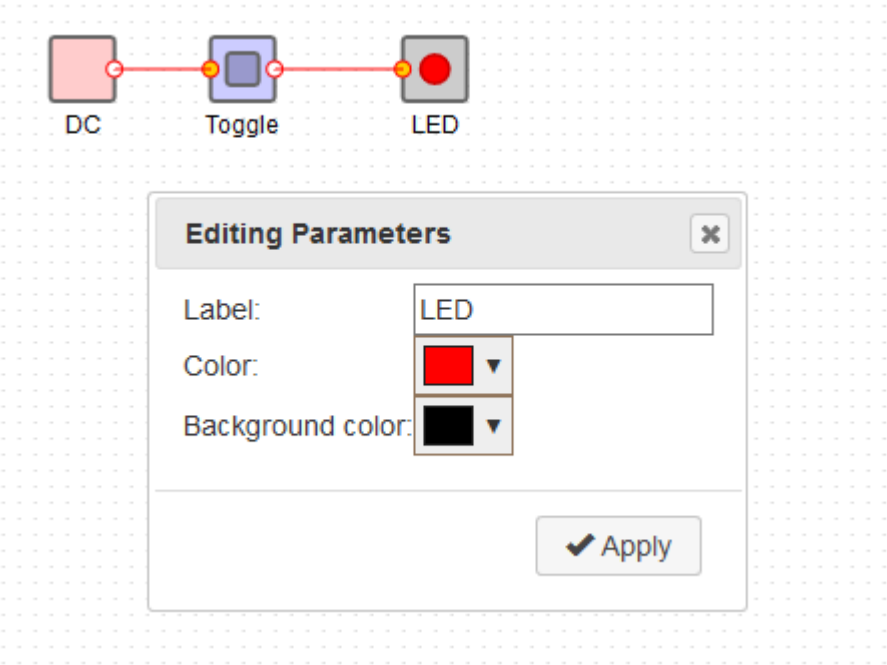


Figure 4: Simulation

4.1 Component Simulation

Different components have additional ways of displaying the simulation. For example, the LED shows its assignment (Fig. 1) by being on-/ or out.

The specification for this kind of component can be found in the component table in the appendix.

4.2 Component Interaction

Some components offer the possibility to interact with the circuit and change its assignments. The Toggle-Button is an example for this. By clicking on it, its assignment on the out-port switches between logical zero and logical one.

The specification for this kind of component can be found in the component table in the appendix.

5 glossary

term	definition
GOLDi	Grid of Online Labs Ilmenau
BEAST	Block Diagram Editing And Simulating Tool
Komponente	A component to create block diagrams, like AND or OR
line	Connection between to components
library	Higher structure including components
project	Highest structure, including a block diagram and libraries
basic libraries	Libraries with basic components. There are three basic libraries. One fort he basic components, one for the basic compound componentes, and one as a deposition for new components
responsive design	Design and size of components is relative to the size of the window
Shortcut	Key combination or mouse action to reach functions faster

6 table of figures