Introduction

The STLUX SMED configurator is a powerful graphical tool which allows to easily configure the SMED engine embedded in the STLUX family of devices. The tool allows the user to focus on creating new SMED algorithms while completely reduces the implementation time and efforts. Once the visual SMED configuration is in place, the SMED configurator can generate a C file and store the whole configuration, ready to be imported in STLUX projects.

The SMED configurator features:
- SMED configuration schemes
- Input configuration
- Clock settings
- FSM (“Finite State Machine”) configuration
- C code generation
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The initial view gives a visual overview of the STLUX architecture. The user can interact with all the elements of the home page and access more detailed views for each component.

Figure 1. SMED configurator - STLUX architecture view
The user can choose to configure:

- The clocks: click on the image representing the SMED clocks.

- The inputs: click on the image representing the SMED inputs.

- The finite state machine (FSM): click on the image representing the FSM.

Alternatively, it is possible to use the top menu to jump into the desired view of the SMED configurator.

**Figure 2. Menu bar**

```
| Home | SMED configurator Scheme | State Machine |
```
2 SMED configuration scheme view

This view allows the user to establish how to use each SMED defining its working mode.

All the possible SMED configuration schemes are:
- Single SMED
- Synchronous coupled SMEDs
- Two synchronous coupled SMEDs
- Two asynchronous coupled SMEDs
- Asynchronous coupled SMEDs
- Externally controlled SMED

The page shows the six SMEDs and for each of them there is a button to enable it and a button to choose the control mode (internally/externally). Each SMED, if not coupled to another, will be configured respectively in the SINGLE mode or EXTERNAL depending on whether the control button is either “Int” (internal) or “Ext” (external).
Figure 3. SMED configuration view

GPIO connect
To change clicking on it
Enabling a SMED will be shown:

**Figure 4. Enabling SMED**

**Clock**
The user can change the clock setting clicking on it

**Name**
The user can put an Alias clicking on it

**Input**
The user can change the inputs setting clicking on it
2.1 **Synchronous/asynchronous coupled SMEDs**

To configure 2 SMEDs in coupled mode, click the “couple” text between the 2 SMEDs required to be coupled.

**Figure 5. Synchronous/asynchronous coupled SMEDs**
The result is that the tool shows graphically the 2 SMEDs coupled and allows the user to configure their features:

**Figure 6. Configuration of 2 coupled SMEDs**

- **Unlock**: To change clicking on it
- **Drive Out**: To change clicking on it
- **Sync/Async**: To change clicking on it. Only for SMEDs 4 and 5 coupled
To remove the coupled mode click click on the symbol that shows the coupling of the SMEDs.

**Figure 7. Removing coupled mode**
2.2 Two synchronous/asynchronous coupled SMEDs

To configure 4 SMEDs (SMED0 - SMED 1 - SMED 2 - SMED 3) into the two coupled mode it's needed to click on the area representing this mode:

Figure 8. Configuring 4 SMEDs into two coupled mode
As a result, the SMED configurator shows graphically the 2 SMEDs coupled and allows the user to configure their features.

**Figure 9. 2 SMEDs coupled**
2.3 Clock setting

Once a SMED configuration scheme has been selected, it is possible to configure the clock of the used SMEDs clicking on the clock label.

Figure 10. Configuring clock of SMEDs
A dialog will be open in order to select one of the all possible values for the clock:

**Figure 11. Clock selection**
2.4 Input setting

Once a SMED configuration scheme has been selected, it is possible to configure the inputs of the used SMEDs by clicking the “input” label.

Figure 12. Input selection
A dialog will be open in order to configure the three inputs of the selected SMED.

**Figure 13. Input selection dialog**

It is possible to enable an input by clicking the ON/OFF button: .

Also it is possible to change the input trigger level by clicking on the trigger icon: .

A menu with the 4 possible values will be opened:
It is also possible to enable the InSig[0] input line supplementary latch functionality used to memorize occurrence of an InSig[0] capture condition.

**Figure 14. Enabling Sig[0] latched mode**

![Inputs settings](image)

This allows a deferred event transition occurrence from any of the configured states to react to the InSig[0] input capture.
The latched information is selectively cleared by entering any of the S0 - S3 states if the latch reset for the state is set in the correspondent SMED state machine page.

Figure 15. Latch mode as represented in the FSM
3 State machine page

The machine states page is used to set the configuration of the SMED registers that control the finite state machine.

Figure 16. Finite state machine (FSM) view

This page is divided into 2 parts:

1. General settings
   a) Interrupt
   a) Dithering
   a) Time stamp
2. Transitions
3.1 General setting

3.1.1 Interrupt settings

The “interrupt settings” label is used to configure the interrupt handling. Clicking on the label “Interrupt Settings” a dedicated window will be opened. The interrupts are grouped in three blocks for the state timers compare events, external input events and counter overflow event.

Figure 17. Interrupt settings
3.1.2 Dithering settings

The “dithering settings” label is used to determine the SMED cycle(s) in which the temporary dithering increment is applied on the selected timer. Any number of cycles may be enabled/disabled.

Clicking on the label “Dithering Settings” a dedicated window will be opened.

Figure 18. Dithering settings
3.1.3 Time stamp settings

The “time stamp settings” label is used to control the dumping feature of the SMEDs. Clicking on the label “time stamp settings” a dedicated window will be opened.

Figure 19. Time stamp settings
3.2 Transitions

State transitions are represented as arrows connecting two states involved in a transition.

Figure 20. State transitions

<table>
<thead>
<tr>
<th>From state</th>
<th>to state</th>
<th>condition</th>
<th>PWM on exit</th>
<th>Counter reset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idle</td>
<td>DEAD Time</td>
<td>Start</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEAD Time</td>
<td>$S_1$</td>
<td>10 cnt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$S_1$</td>
<td>$S_2$</td>
<td>20 cnt or $S_1$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$S_2$</td>
<td>DEAD Time</td>
<td>$S_1$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **State Name**: Click to change
- **State**:
- **Transition**: Click to change
- **Latched information**: Interrupt on state timers compare events
- **State Timer**: Click to change
- **Transition summary**
To add a new transaction, click on the button \( + \) relative to the initial state of the transition. A dedicated window will be opened to select the end state of the transition.

**Figure 21. Selecting end state of the transition**

To define a transition **three steps** are needed:

1. **Path:**
   Determine the path of the transition from the initial state to the end state. The tool automatically determines the type of transition (sequential or controlled) or, in case of ambiguity, leaves the choice to the user.

2. **Condition**
   Determine which is the condition that generates the transition: the state compare timer, edgeX triggering event, edgeY triggering event and their combination.

3. **Action**
   Determine which is the action of the transition in term of the PWM value and reset counter.
For the controlled transition the user can enable the possibility to enter the hold state and decides which is the condition that determines the exit from the hold state to go on the end state of the transition.
The tool uses four different symbols to identify the transition:

- Sequential transition
- Controlled transition
- Controlled transition with the hold jump and exit from the hold when the same condition is retriggered.
- Controlled transition with the hold jump and exit from the hold when a coupled SMED enters in hold.
4 Menu bar

The menu bar contains the commands that can be used to manage the application.

The available menus are:

- **New**
  - Create a new project
- **Load**
  - Load existing project
- **Save**
  - Save
    - Save the active project
  - Save As…
    - Save the active project with a new name
  - Save C File
    - Save the text file, that contains the “C” source code of a simple function that initializes all the MIF and SMED registers conforming to the current configuration.
- **Option**
  - Open the Option window
- **Help**
  - Help
    - Open this file
  - Release Note
    - Open the Release Note document
  - About
    - Open the About window.
5 Revision history

Table 1. Document revision history

<table>
<thead>
<tr>
<th>Date</th>
<th>Revision</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-May-2014</td>
<td>1</td>
<td>Initial release.</td>
</tr>
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</table>